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JANUARY 1946

MECCANO

MAGAZINE




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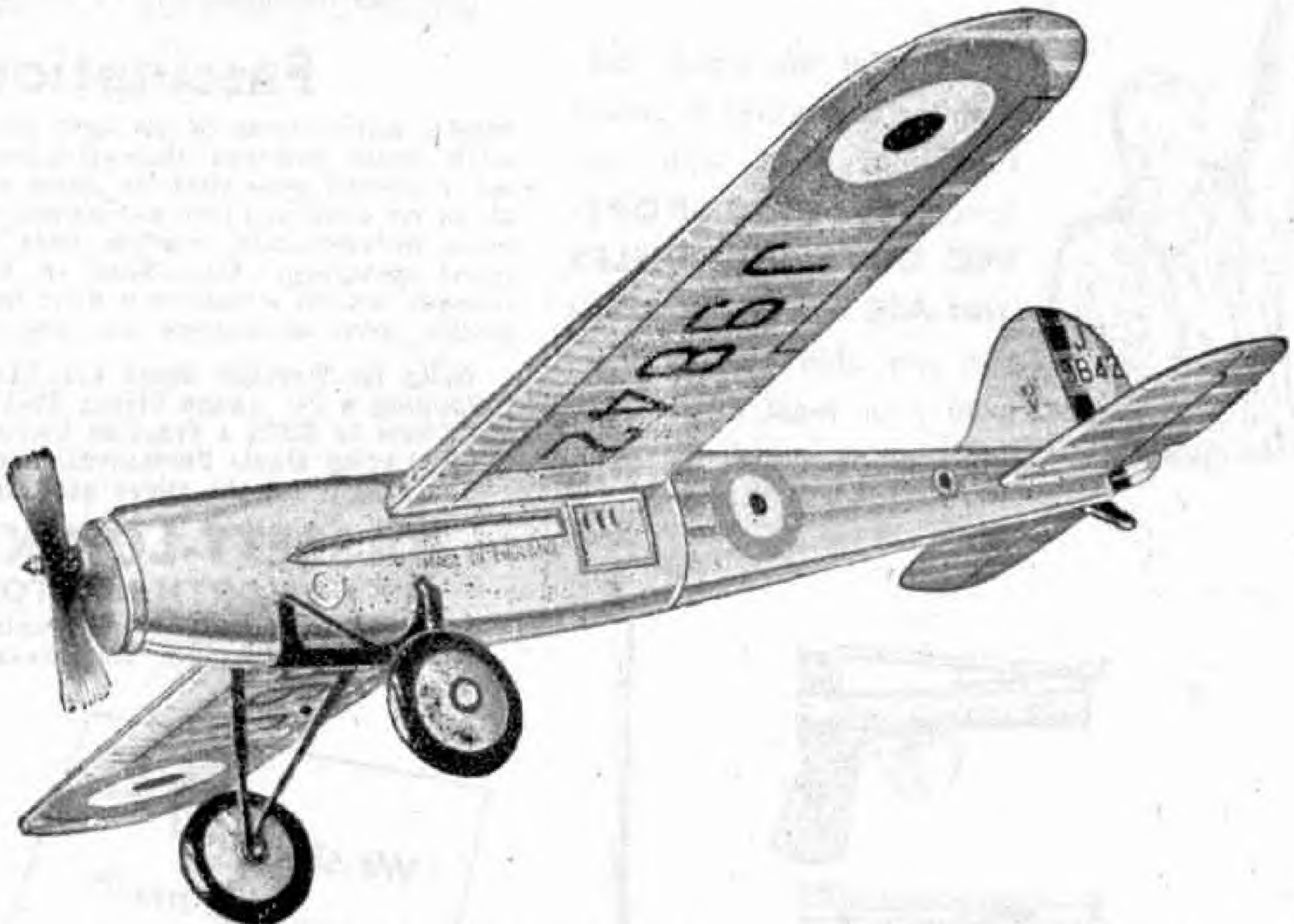


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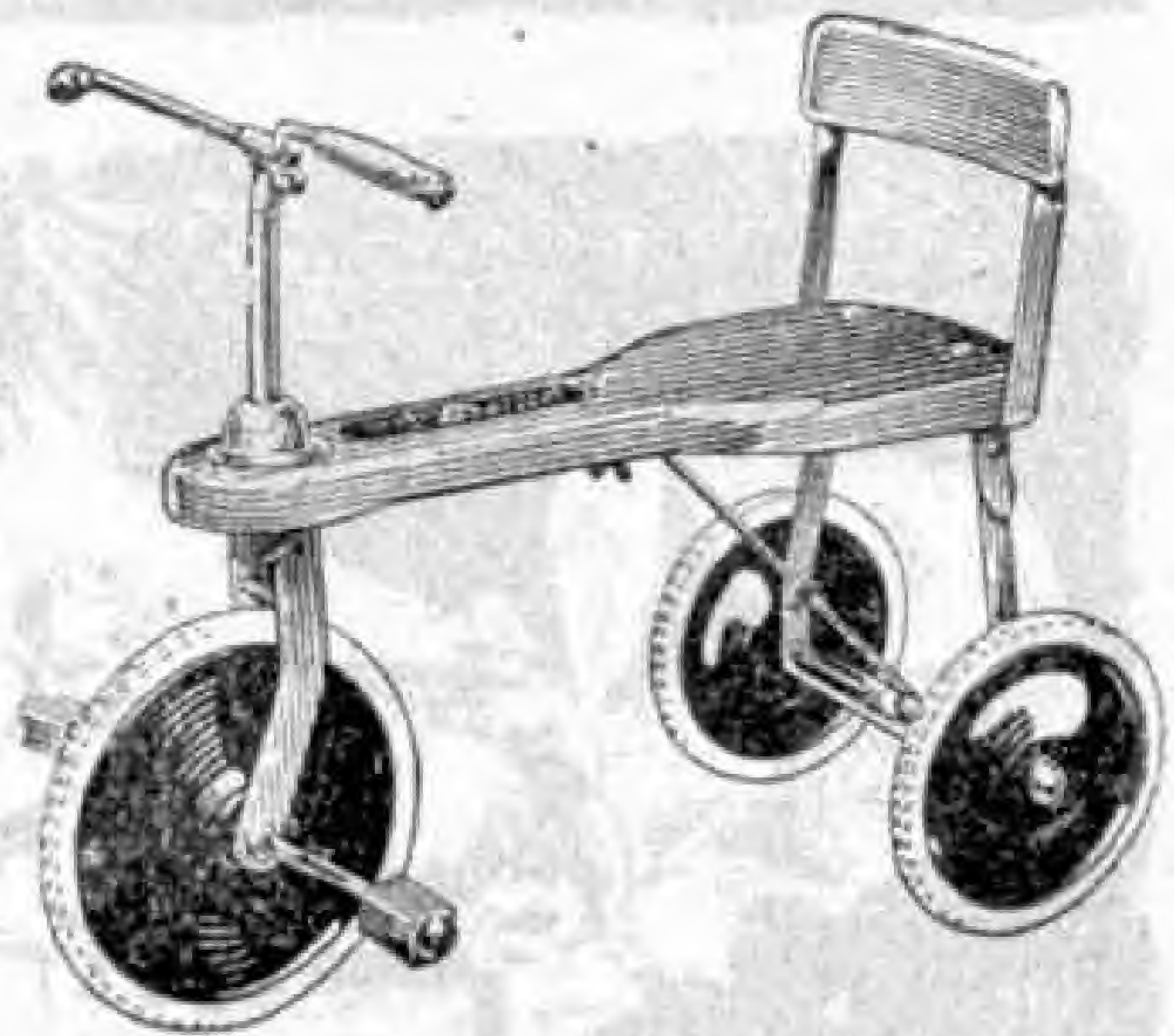
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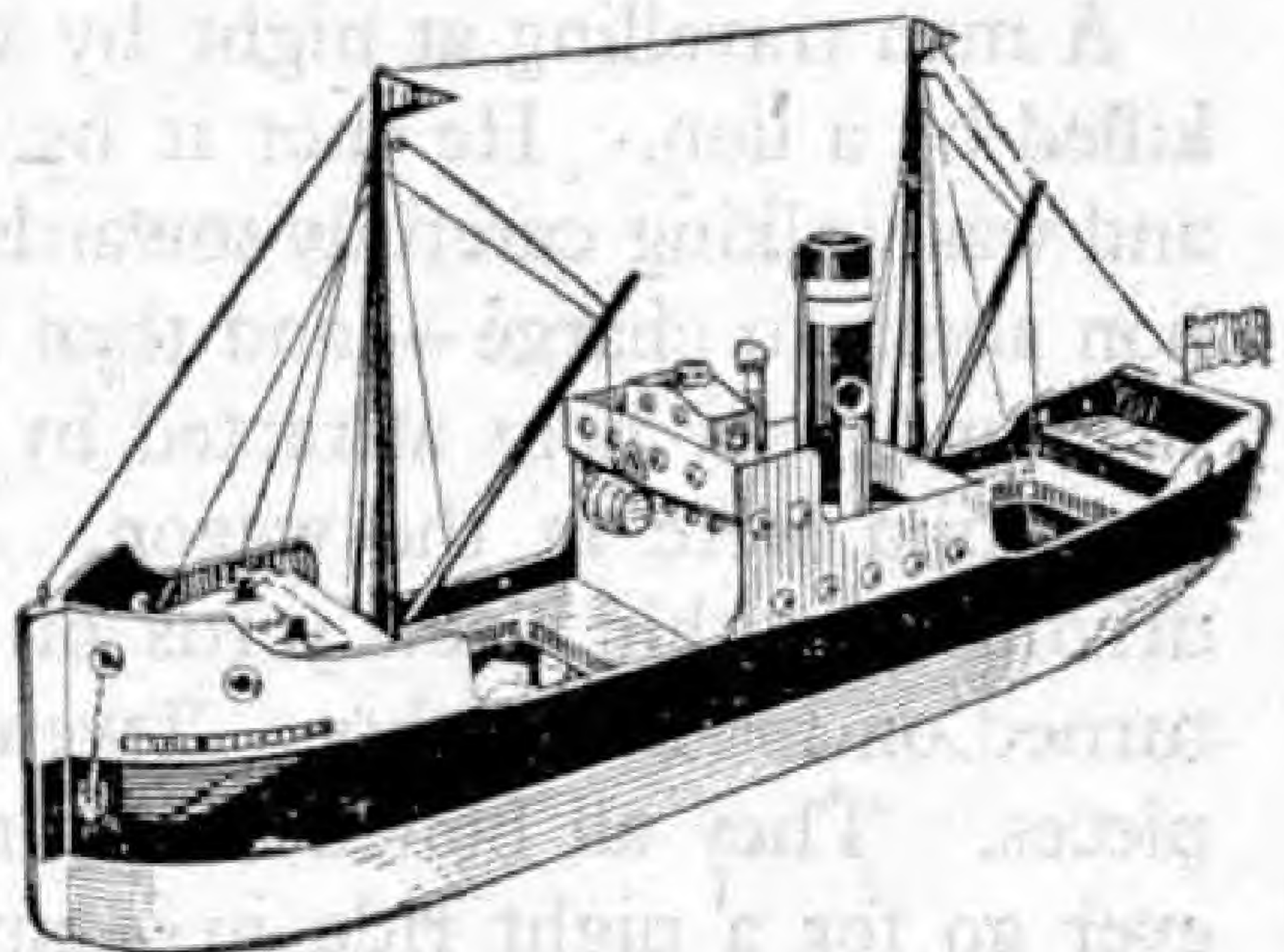
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Next Month: "GERMAN WARPLANES 1944-45." By J. W. R. Taylor

MECCANO

MAGAZINE

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Vol. XXXI

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With the Editor

A HAPPY NEW YEAR!

Once again I have the pleasure of wishing every reader *A Happy New Year*. And this time my wish is free from the depressing thoughts of war that have hung over us all for so long. Peace at last.

Peace, yes, but not yet peace and plenty. The plenty will not return until we have straightened out the tangles of a world at war, and to do that we shall have to work with a will, shaping the future for ourselves by our own efforts. There are people who moan about the disappearance of "the good old days." They were not so good for the millions who suffered from poverty and unemployment. There is, if we work to make it so, a good world ahead. Push the moaners aside and let us get down to it.

A good slogan always helps. Try this: *age quod agis*.

On the Road To-morrow

I wonder how this post-war world upon which we are entering will differ from the old days. Probably there will not be a great deal of change at first, but changes are sure to follow as attempts are made to adapt the knowledge that has been gained during the war. To take one example, what will the motor car of to-morrow be like? Already descriptions of the first post-war products of many famous firms have appeared. In general appearance these do not differ very greatly from those we saw on the roads six years ago, although of course they all include some improvement or additional gadgets that add to their efficiency, and to the comfort of driver and passengers. For instance, built-in jacks seem to be universal, and those who have had to change a tyre on a dark night in pouring rain will know how much that means!

But what readers of the "M.M." will be interested in most is the further prospects of the motor car. Will the engine be pushed to the rear, with the disappearance or reduction of the bonnet, which looms so large in many makes, especially certain American cars. More use will be made of light alloy metals, which have been developed so amazingly during the war, and an interesting pointer is the appearance in this country and in France of designs for what may be called a "People's Car."

We have also been threatened with the atomic power car, while the jet propulsion engine also may be applied to road vehicles. These are questions for the future, and for a few years at any rate our roads should not look very much different from to-day.

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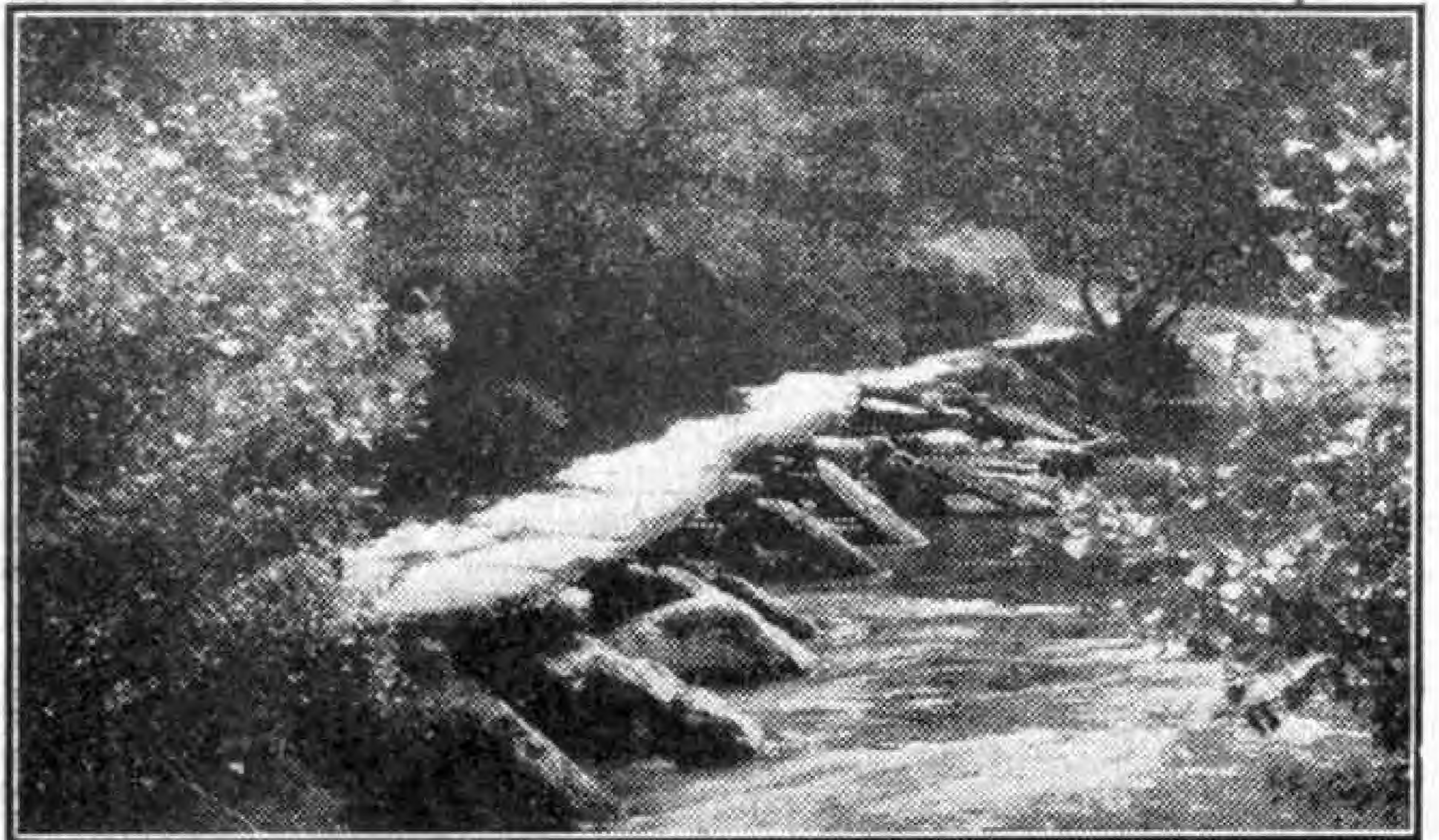
The English Bridge

By Garry Hogg

NO country surpasses ours in the richness and variety of that lovely and noble structure, the river bridge. Up and down the land there are still to be found hundreds of bridges that are superb examples of mediæval craftsmanship in stone, living tributes to the skill and patience of men who have been dead these four and five hundred years.

Records and archives speak of the importance attached to the building and maintenance of such structures, sponsored by kings and nobles and often undertaken by monks and various religious fraternities. Absolutions and indulgences were granted in consideration of moneys or materials such as timber and stone bequeathed in wills by wealthy men and women for bridge building purposes. In one example of 700 years ago Reginald de Rosels commissioned the Abbot of Whitby to build a stone bridge across the Esk, and as reward the man's ancestors were "absolved of all faults and transgressions they might have committed against the Church of Whitby, and made participants of all the good works, alms and prayers of the said

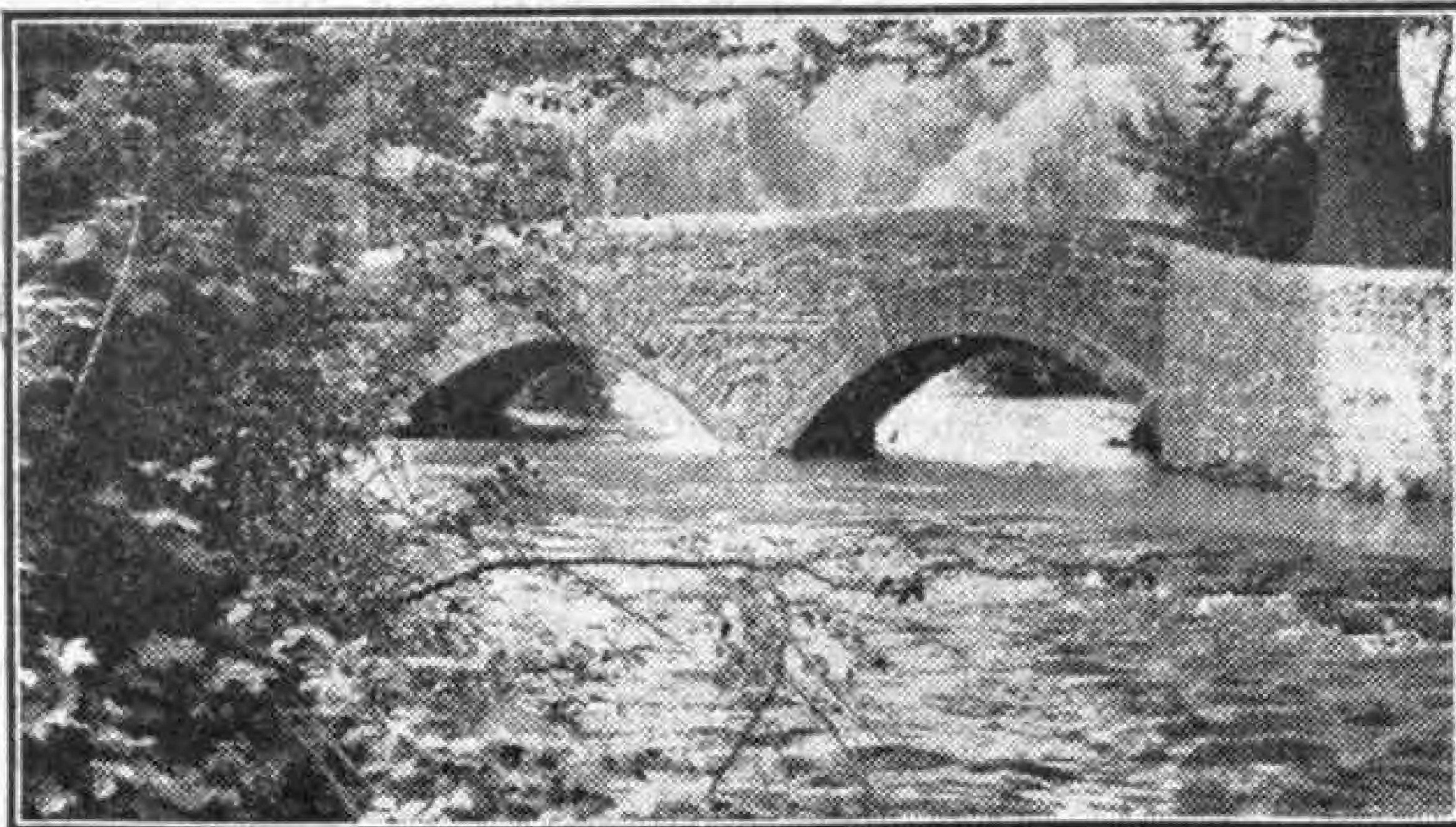
Church." About 200 years later, Joan, Lady Bergavenny, left the sum of £10, a considerable sum at that time, for the "repaire of foulle roads and feeble bridges."



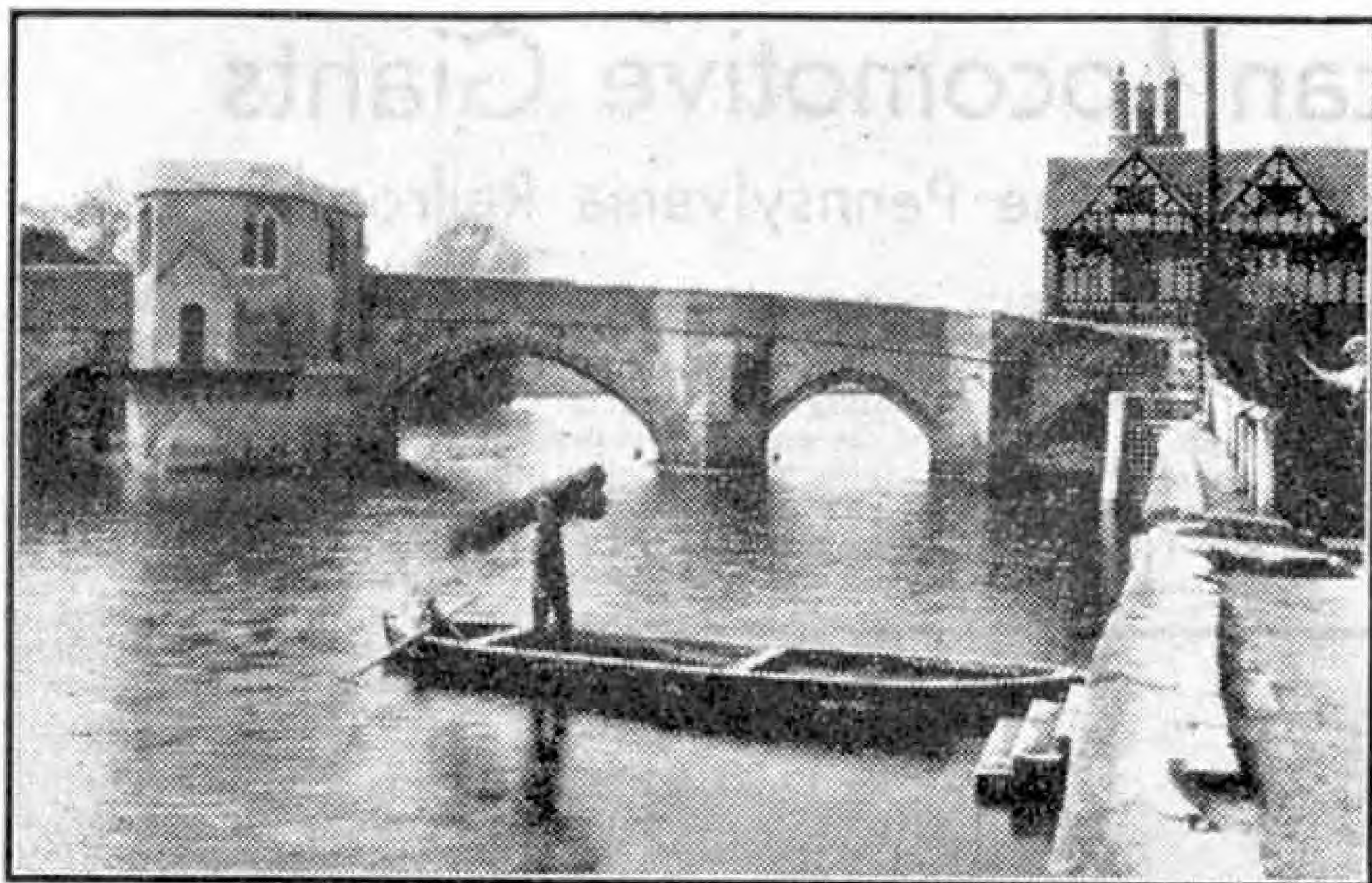
Tan Steps, in Somerset, a fine example of a primitive type of bridge. The illustrations to this article are reproduced from photographs by Will F. Taylor.

Towns unwilling to undertake the maintenance of bridges that united them with other towns similarly backward in public spirit, were sometimes released from their obligations by bodies such as the Birmingham Guild of St. George and the Holy Cross; this "mainteigned and kept in goode reparaciouns two greate bridges of stoone and divers foule and daungerous high wayes, the charge whereof the town hitsellfe is not able to mainteigne."

Chapels and chantries were built on these bridges, as for instance on the noble St. Ives Bridge in Huntingdonshire. Here the pious traveller or citizen might halt and pray for the soul of the man or woman through whose own piety and generosity the bridge had been built. And after praying he might add his donation towards its upkeep. Gateways too were frequently built actually on these mediæval bridges. They served the dual purpose of fortification and toll-bar. Most of them were



A pack horse bridge at Dunster, also in Somerset.



A stone bridge across the Ouse at St. Ives, with boatmen unloading reeds.

dismantled with the coming of the bulky stage-coach, but one fine specimen survives on the Monnow Bridge, Monmouthshire.

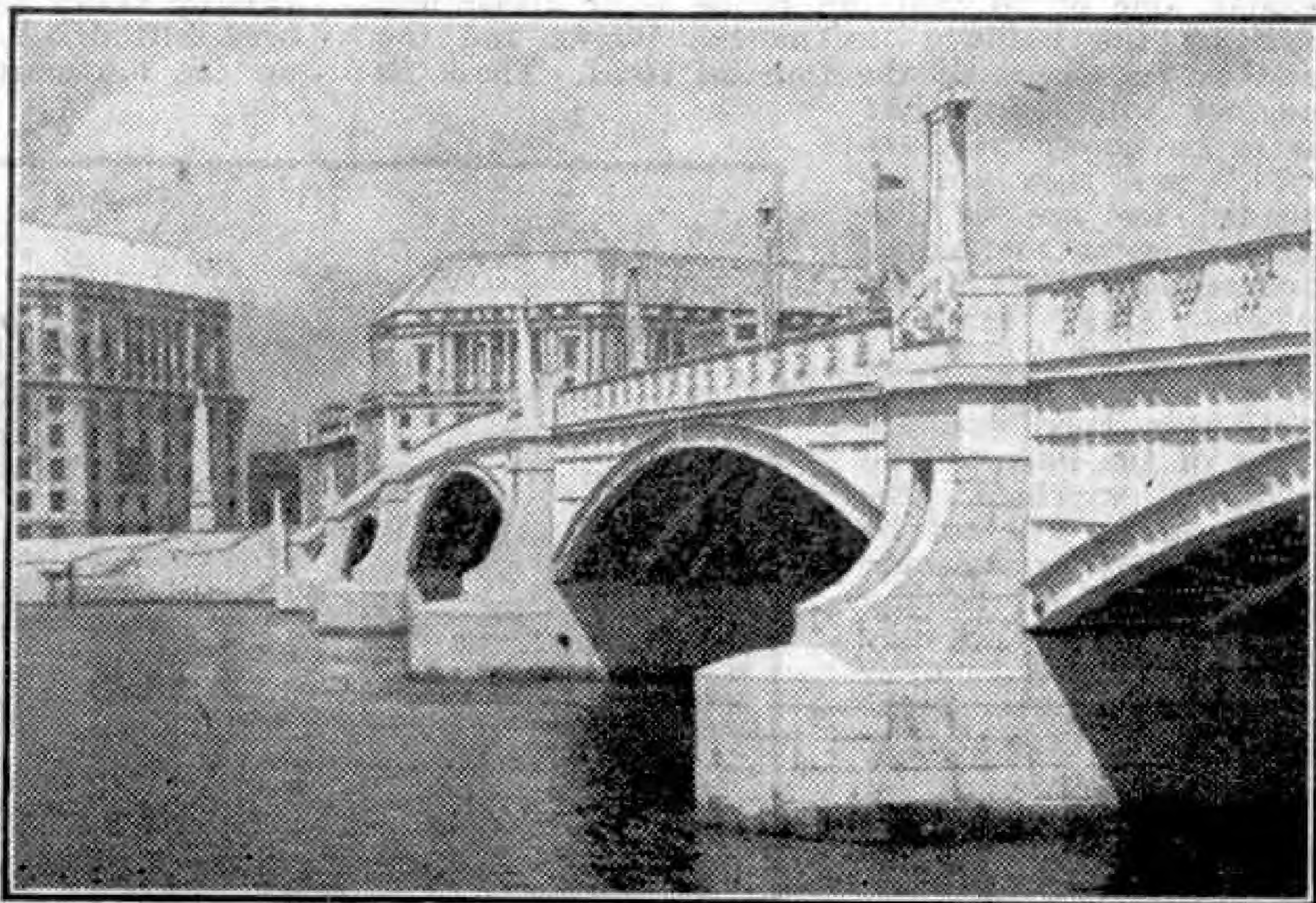
More primitive than these bridges are the so-called "clapper bridges." These are massive slabs of stone laid across short, solid piers set in the river, and they serve as footbridges only. As they have no parapets, they can stand up to immense weights of floodwater without collapse. The West Country has many fine examples of these, and there too are found numerous ancient "pack horse" bridges. For centuries the great bulk of merchandise was carried on the backs of mules or horses. Wool and salt, pig iron, lead, farm produce and tin were carried thus, often in pack horse trains of 20 or more beasts tied head to tail. Their tracks may still be traced up and down the country, and the last of these pack horse trains were to be seen traversing Westmorland within living memory. The bridges built expressly for them were of peculiar design. They were just wide enough, often steeply arched and with parapets not more than a foot high, to allow for the overhang of the load.

Gradually the old craft of bridge building in solid stone, long the heritage of monks and lay brethren, was superseded by the use of methods and materials

better suited to the march of time. Increased loads, and above all the increased speed at which they came to be transported when horse-drawn wagons and trailers came into being, led to a search for better means of spanning rivers. The first big bridge to be built of cast iron was erected at Ironbridge in 1779 and stands to-day a monument of originality and enterprise, even if dwarfed by such engineering marvels as the Forth Bridge, the

great suspension bridges at Bristol and Newcastle-on-Tyne, or the giant transporter bridge at Middlesbrough. But though steel and reinforced concrete tended to take the place of the old stone block and keystone arch, and the cantilever and suspension bridge to replace the old semi-circular, segmental or pointed arch, yet there is still craftsmanship in stone blocks allied with the gentler curve or arch made possible by steel, as who can deny when looking at the graceful lines of the new Lambeth Bridge?

Yet one is tempted to wonder whether our bridges of to-day will survive for four hundred years, as have so many of those built by our ancestors. Nothing can surpass the sheer craftsmanship of those old bridge builders.



The new Lambeth Bridge, London.

American Locomotive Giants

New Designs on the Pennsylvania Railroad

VISITORS to the United States and Canada cannot fail to be impressed and astonished by the immense size of the locomotives that haul the famous trains of those countries. Limitations on size are not so severe in North America as they are in Great Britain. The rail gauge there is the same, but the loading gauge is both higher and wider, and the result of this is seen in the development of very large

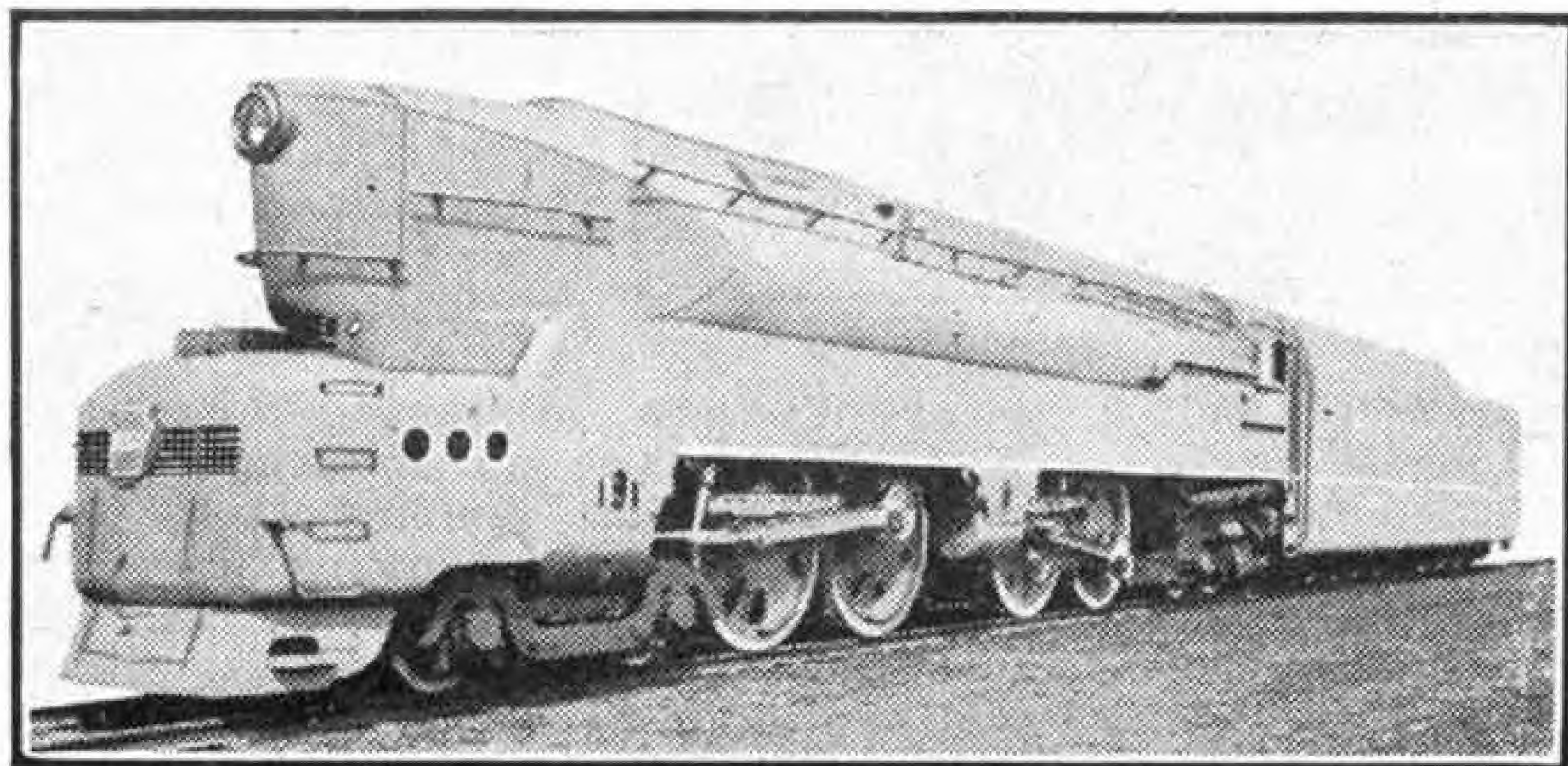
on each side of the engine, and of two separate sets of coupled wheels. This is an unusual way of making use of four cylinders. As there are four-wheeled leading and trailing trucks the wheel arrangement of the engine is expressed as 4-4-4-4, the two sets of driving wheels being indicated separately.

The total length of the new "T1" engine, with tender, is approximately 123 ft., and its height above the rail is 15 ft. 6 in. The driving wheels are 6 ft. 8 in. in diameter. Steam pressure is 300 lb. per sq. in., and the tractive effort that the engine can exert on starting is 64,650 lb. The total weight of the engine and tender in working order is 930,200 lb., or about 415 tons. The tender carries 41 tons of coal and 19,500 gallons of water.

It is interesting to compare these figures with the corresponding ones for a British main line locomotive, such as the L.M.S. streamlined "Pacific" of the "Princess Coronation" Class. The total length of one of these engines with its

tender is 73 ft. 9½ in. and its height above the rail is 13 ft. 2½ in. The driving wheels are 6 ft. 9 in. in diameter, and the tractive effort, with a boiler pressure of 250 lb. per sq. in., is 40,000 lb. The total weight in working order of the British engine is 162 tons 3 cwt., or considerably less than half that of the Pennsylvania engine. The tender too is very much smaller. It holds 10 tons of coal and its water capacity is 4,000 gallons.

The second of the new locomotives described in this article is even heavier than the "T1" class engine, for its total weight in working order, with tender, is more than 450 tons. It has been designed for hauling heavy goods trains at high speeds, and has been introduced largely with the idea of speeding up the movement of wartime traffic. This it will



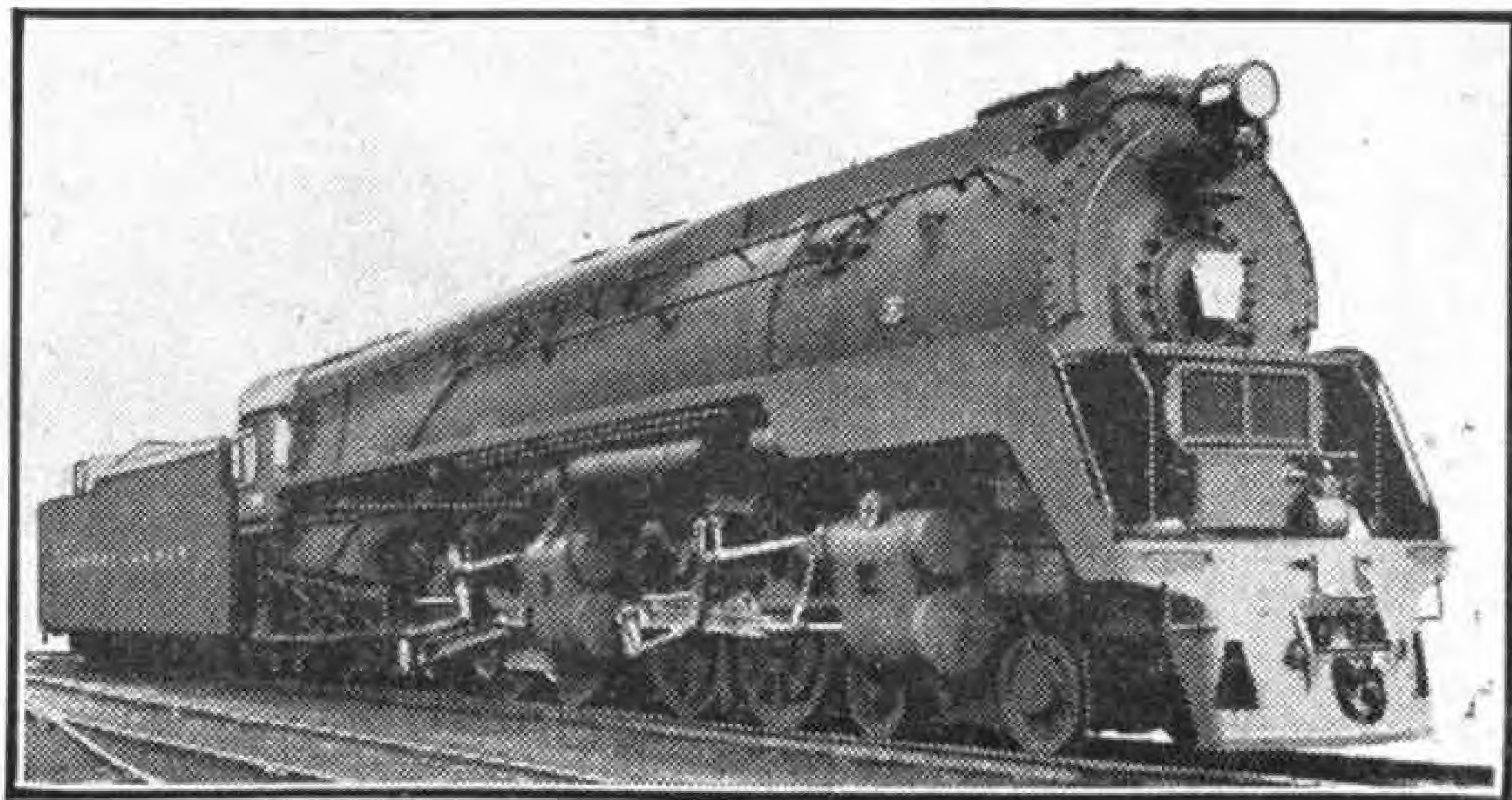
One of the new "T1" 4-4-4-4 class of the Pennsylvania Railroad recently introduced for passenger service.

locomotives, designed to haul enormous trains of large and heavy coaches or huge box vans or coal and ore wagons.

Every important American railway has its locomotive giants, many of which have features of the greatest interest apart from their size, for American railway engineers are always ready to try out new schemes. On these pages we illustrate huge designs that have recently made their appearance on the Pennsylvania Railroad, together with a drawing of one of a very unusual type that as yet is only projected and can fairly be described as a locomotive of the future.

The first of our illustrations shows a streamlined engine, one of 50 that are to be built altogether, half by the Baldwin Locomotive Works and the rest in the shops of the railroad itself. These 50 engines will form what is to be known as Class "T1," and they are intended for use on the main lines in the mountain section of the railway, where their immense pulling power, a great increase on that of previous passenger train locomotives of the line, will be put to excellent use. The engines will not be kept entirely for passenger traffic, for in hauling goods trains too they will give increased pulling power at higher speeds than were possible before their appearance.

A glance at our illustration of No. 6110, the first of these new engines, reveals an innovation—the use of two cylinders



A giant 4-4-6-4 goods engine with a total weight of almost 450 tons.

do by moving trains much faster than engines previously built have been able to do, and also by making longer continuous runs without stopping for coal or water, for its capacious tender holds 40 tons of coal and 19,000 gallons of water, and apparatus for scooping up water from track troughs is fitted.

The Pennsylvania Railroad turbine locomotive, designated "S2," is the first direct drive steam engine of this type to be built in the United States. It is designed to develop 6,900 s.h.p. and so to provide sufficient power to haul a full length passenger train at speeds up to 100 m.p.h. It is simple to operate,

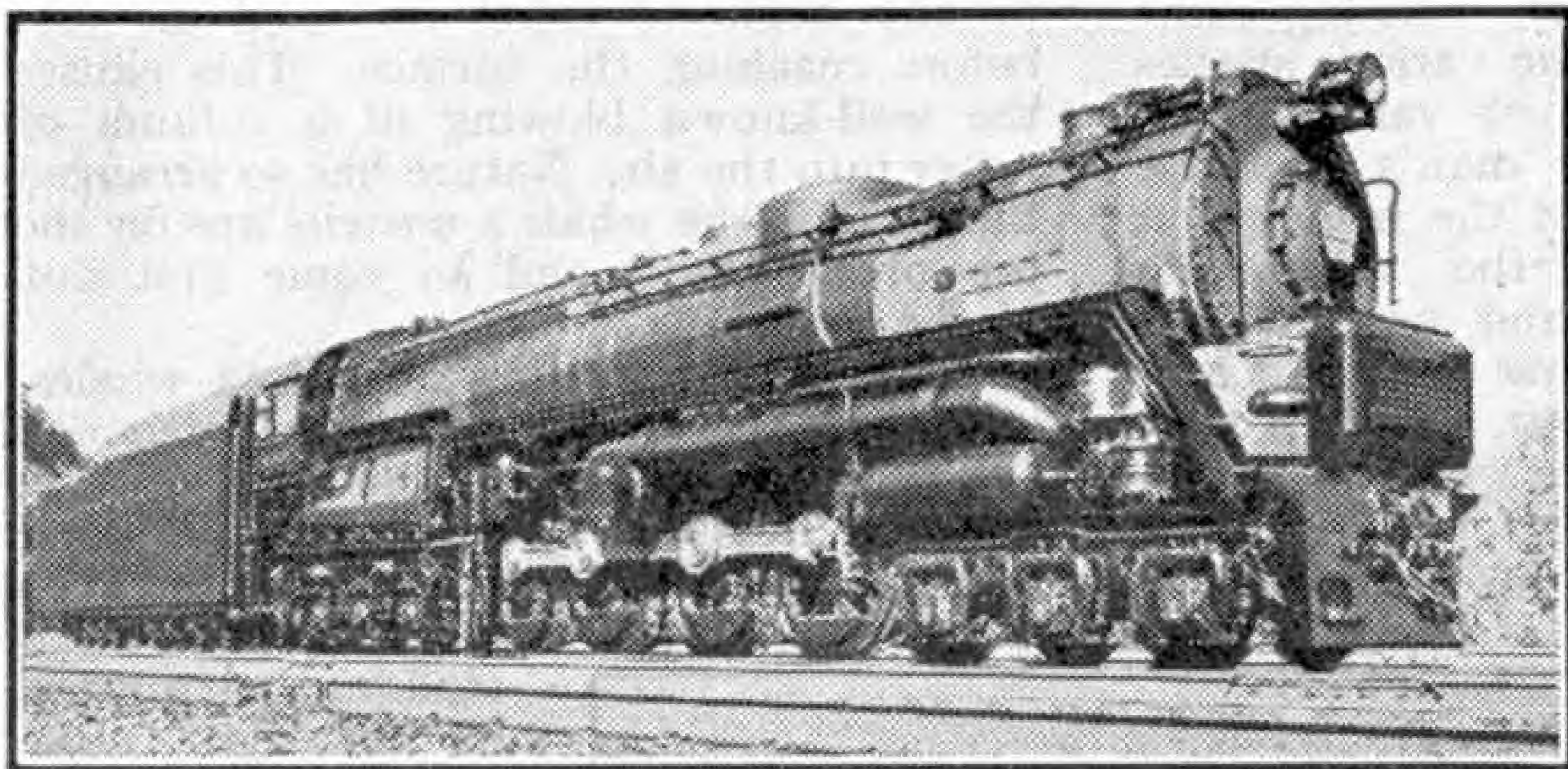
both forward and reverse movements being controlled at all speeds by a single lever operating pneumatic controls, and automatic devices make it impossible to handle the mechanism incorrectly.

The main or forward drive turbine is mounted at the right-hand side, shown in our illustration of the engine. It is about 3 ft. 9 in. in diameter and is described as smaller than a living room easy chair. In spite of the enormous power that it develops it contributes less than one per cent. to the total weight of the engine, which with that of its tender amounts to 446 tons. A smaller turbine on the left-hand side is

brought into operation when the locomotive is to be moved backward.

There are more than 1,000 chromium steel blades in the forward turbine, and the steam in passing through the entire battery of these is reduced in pressure from 310 lb. per sq. in. to only 16 lb. per sq. in. As with normal locomotives, the exhaust steam is used for creating draught through the fire-box, and this is continuous instead of coming in a series of powerful blasts. The power is transmitted through heat-treated alloy steel reducing gears, which operate continuously in an oil bath and convey 97 per cent. of the turbine output to the driving wheels. There are eight of these, the wheel arrangement being 6-8-6.

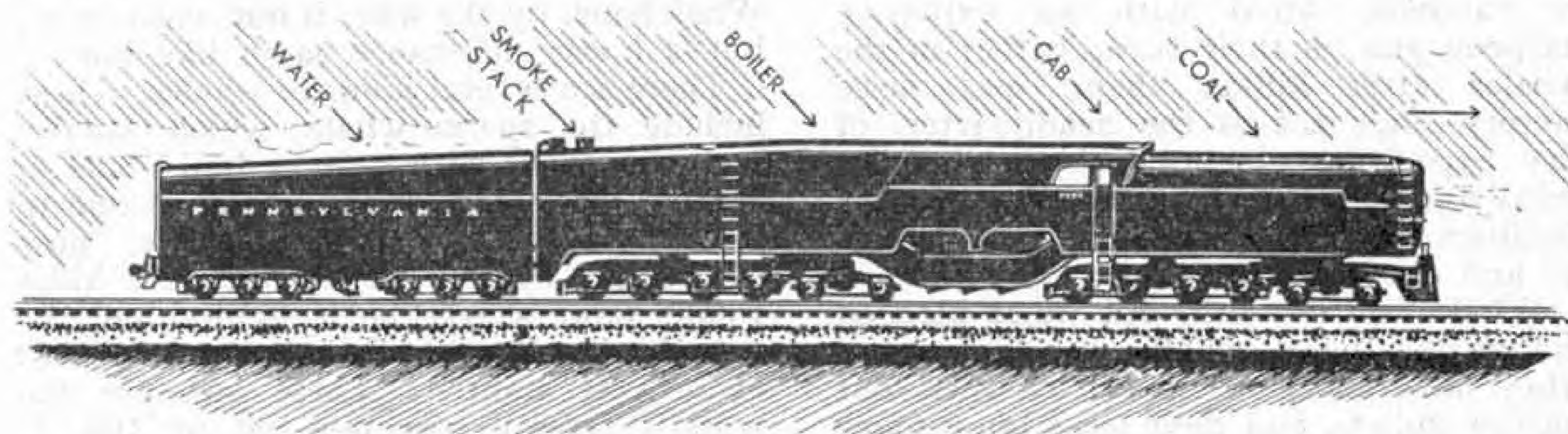
This locomotive is on the same gigantic scale as the others that we have described, for it covers 123 ft. of track and the tender carries 37½ tons of coal and 18,000 gallons of water. It does not represent the most advanced ideas on locomotive development of the engineers of the Pennsylvania Railroad, however, for they have designed an entirely new type of powerful high speed steam turbine engine for both passenger and freight service that from its unique appearance has been called the "Triplex." The drawing at the foot of the page shows the unusual appearance that this great engine will present when completed. The coal compartment comes first and the cab too is ahead of the boiler, with the smoke stack so far behind that at first glance the engine appears to be travelling backward. A capacious water tender brings up the rear. The two turbines of this strange engine develop 9,000 s.h.p.



The Pennsylvania Railroad's direct drive steam turbine locomotive, which develop 6,900 s.h.p.

This new type of goods locomotive, forming "Q2" class, is a further example of the use of separate sets of coupled wheels. The front cylinders drive two pairs of wheels and the second pair provide driving power for three pairs. There is a four-wheeled leading truck and a trailing truck, also of four wheels, that incorporates a booster engine to provide extra starting power. Thus the wheel arrangement of the "Q2" class is 4-4-6-4. The tender has 16 wheels, and roller bearings are used on all axles. The driving wheels are 5 ft. 9 in. in diameter. Steam pressure is 300 lb. per sq. in., and the initial tractive effort, that is the pull that can be exerted on a standing train, is 114,860 lb.

The two locomotives that we have described, although representing great advances in speed and power and introducing many novel features, are in general of the type that has been developed on all railways over a long period. Now Pennsylvania Railroad locomotive engineers are looking ahead. They have turned their attention to the steam turbine, which has already replaced the familiar cylinders, pistons and connecting rods in a few experimental locomotives in various parts of the world, notably on the L.M.S. in Great Britain, where Turbomotive No. 6202 has been in service for some years. The turbine has proved remarkably efficient and economical in electric power stations and for propelling ships, and there seems no reason why a satisfactory design should not be worked out for locomotives. This form of power unit has the great advantage that it gives a continuous flow of power instead of a series of impulses.



Futuristic locomotive design. This drawing shows what a giant steam turbine engine projected by the Pennsylvania Railroad will look like. The coal compartment and cab are ahead of the boiler.

Whaling Has Started Again

By David Gunston

DURING the war years whaling came to a standstill and the various species of great whales, sources of valuable oil, increased unchecked by man's hunting. Now conditions permit of the resumption of the industry, and the world-wide shortage of foodstuffs and commodities of all kinds makes it of first importance.

The first great post-war whaling campaign was planned to extend from November 1945 to March of this year, during which time a large whaling convoy

usually begin to expel the used air just before reaching the surface. This causes the well-known blowing of a column of water into the air. Nature has so arranged things that the whale's nostrils are on the top of the head and so come first out of the water.

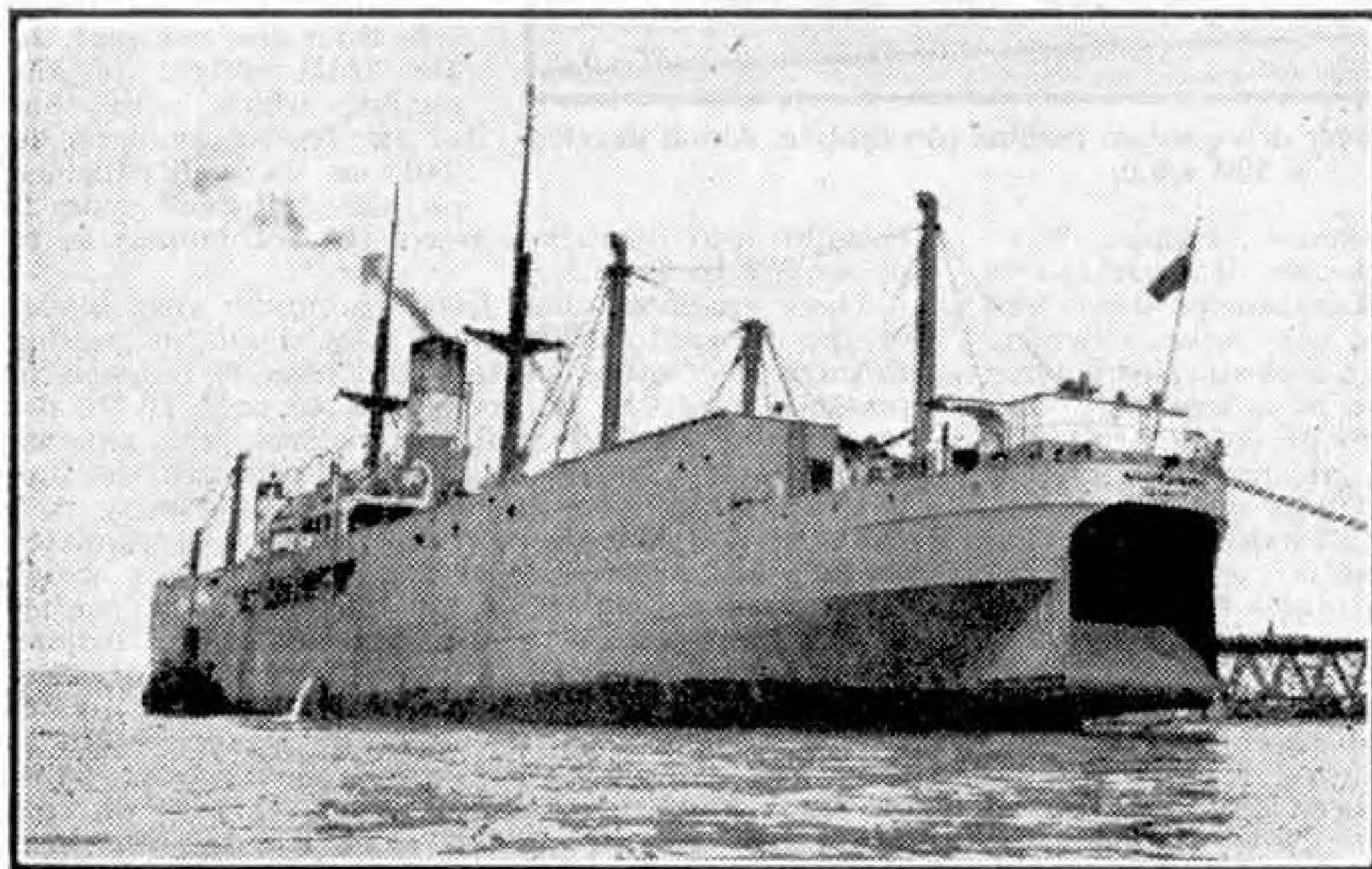
The sense of smell is absent in whales, but they have very acute hearing, although the ears are hidden at the ends of tiny holes in the skin. So intense is this sense that the whale catchers have to keep

very quiet when stalking their quarry, as the least noise or vibration in the water caused by ships' screws would cause the monsters to take fright and make off.

The skin is thick and smooth, and covers a very thick underskin of blubber or fat that acts as protection from the cold and as a reserve of food. It is a tough substance and has to be cut off with sharp knives. Whales are carnivorous, living on vast quantities of

tiny fish and shrimp-like fry called krill. Close to the surface swims the giant, through a shoal of these creatures, which tinge the ocean pink. A unique arrangement of a curtain of hanging plates of whalebone and stiff hairs inside the mouth filters the solid food from the water, leaving it in the mouth to be swallowed. Whalebone, by the way, is not really bone, but a horny substance more like hair.

There are several kinds of whales. These include the sperm whale, which usually hunts in packs with a fierce bull-whale in charge; the whalebone whale, formerly most hunted for its whalebone, now superseded by the use of steel; the killer whale, more shark-like in habits; and the valuable fin and blue whales, now almost exclusively hunted. These last are the world's largest creatures 90 or 100 ft. long and some 40 ft. round at their widest circumference. They turn the scales at



"Sourabaya," typical whaling factory ship. Captured whales are hauled aboard through the opening in the stern.

will hunt all along the rim of the vast Antarctic ice cap. Modern whaling is a carefully organised, up-to-date industry, a far cry from the old days when slow sailing-ships were used and the whales were killed with harpoons thrown by hand from open boats. Two kinds of vessels are used. Fast little whale chasers or catchers, fitted with an explosive harpoon gun on their bows, gather in the whales after killing them; and large factory ships act as the headquarters of the expeditions, supplying the smaller ships and also providing floating factory facilities for the processing of the whale oil and other products.

Whales are not fish, but warm-blooded mammals, living wholly in the water. They have enormous mouth cavities, but narrow gullets, and their large lungs allow them to stay under water for long periods. When they come up to breathe they



Catchers, or chasers, alongside a factory ship in polar regions. The vessels are encrusted in ice.

90 tons or so, more than the weight of a dozen double-decker buses. Their gape would easily engulf a light car! Some 40 tons of precious oil come from each whale carcass.

Let us follow a whaling expedition at work. Life is hard in these South Polar regions, and the men of the high-powered little chasers are tough. Armed with powerful binoculars, the look-out man in his precarious perch scans the icy waters for whales. Blue whales, the largest and therefore the most economical to hunt, are the first target, and with luck the cry of "*Thar she blows!*" or "*Whale-ho!*" soon goes up. The engines are slowed down and the great monster is skilfully stalked. At the harpoon-gun in the bows, with its 6 ft. harpoon fitted with a delayed explosive charge, the gunner takes careful aim. A crash, and the charge has done its work. But the whale is not yet dead. The line attached to the harpoon is paid out and often a long chase ensues, with the whale towing the ship by the stout cable fastened to powerful winches.

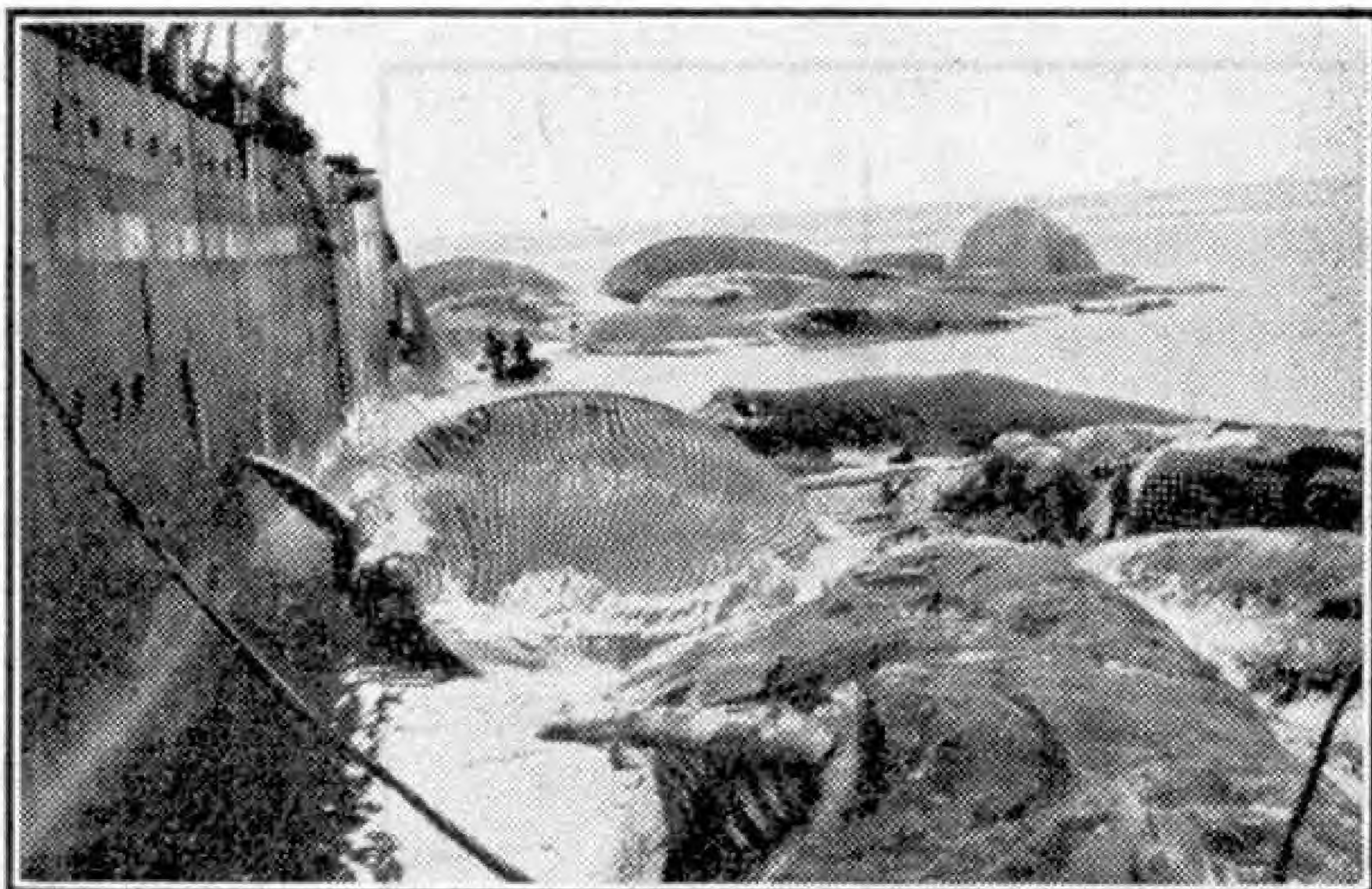
By skilful manœuvring another harpoon finds its mark—perhaps several more—and the giant whale is at last dead. A long tube is thrust into its belly and air is pumped into it to prevent the carcass from

sinking, and it is marked with a flag for recovery later. When several whales have been obtained, their carcasses are drawn alongside and towed back to the factory-ship.

These vessels are marvels of modern shipbuilding. The deck space has to be exceptionally large to provide plenty of room in which to cut up the dead whales, so the masts, funnels and superstructure are arranged on each side. The stern is

fitted with a wide slipway through which the great body is dragged by a number of steam winches, the largest of which has a pull of 40 tons. Provision is made on board for the extra crew carried as factory workers, as well as supplies and equipment for the several catchers to which the factory ship acts as parent.

The building of these ships has been given high priority in British shipyards, and several have been put in hand for purchase by foreign governments. One

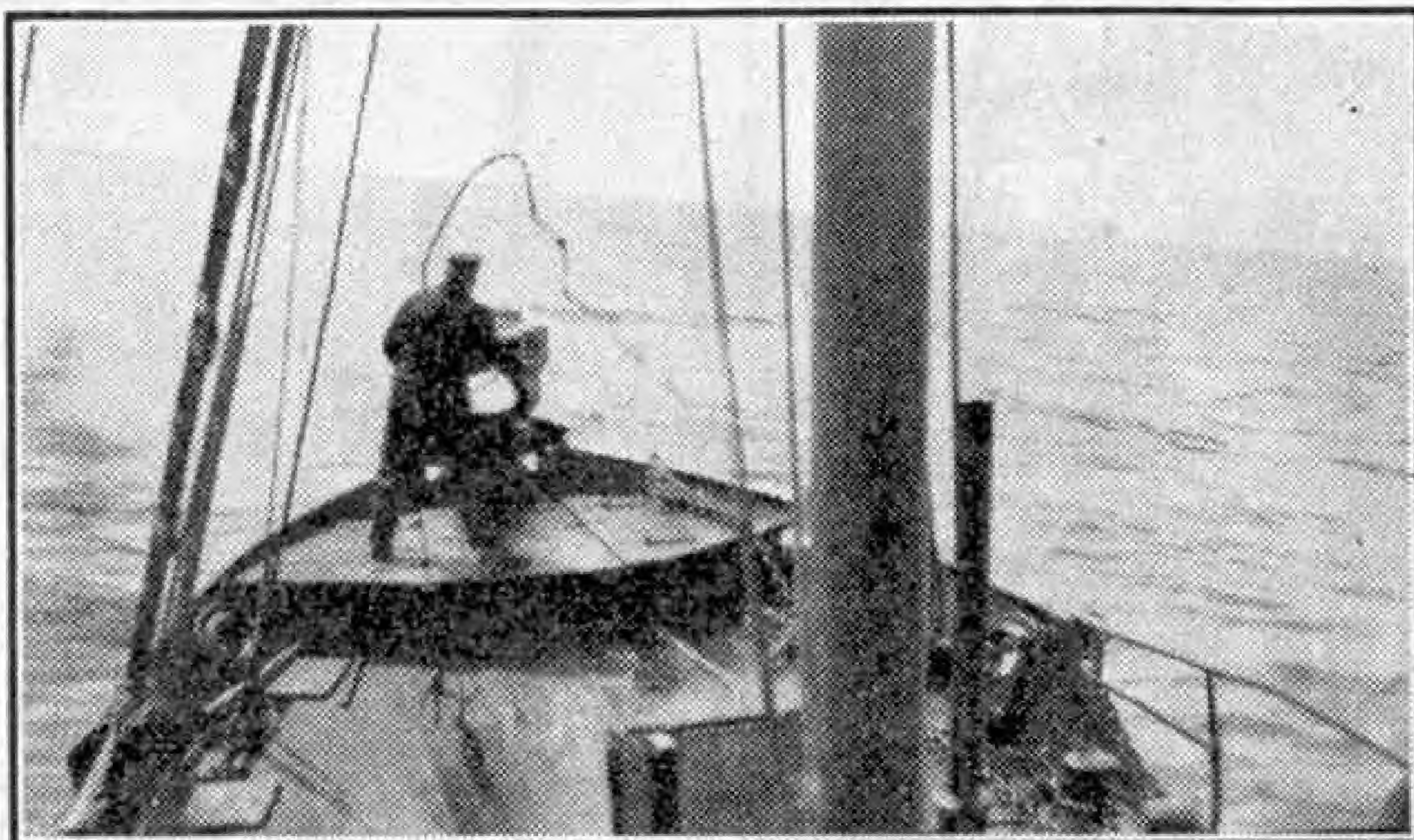


Whale carcasses alongside "*Sir James Clark Ross*," a factory ship, in the Antarctic.

of the most up-to-date, the 21,000 ton "*Norhval*," is a typical example and a few details about her may be of interest. She is 550 ft. long and 74 ft. in width, and has a depth of 57 ft. Her total capacity for whale oil is 19,150 tons,

carried in 36 tanks. Extra heavy steel construction with additional framing gives protection against the pack ice. Over 140 electric motors are installed, 96 of them in the factory, which is chiefly situated in the main 'tween decks. For direct contact with her base in Norway from the Antarctic wastes, powerful radio transmitters are fitted as well as radiotelephone apparatus for speaking to the catchers. Other noteworthy features include a large hospital complete with dispensary; electric-hydraulic steering gear controlled by telemotor gear from the wheelhouse; twin screw triple expansion steam engines; fresh water distilling plant with a daily capacity of 750 gallons; enormous generators to supply the demand for current all over the ship; low temperature refrigerating plant; and a complete dual oil pumping and oil fuel installation. There are over 8,000 tons of steelwork in her structure.

In a sister ship, "*Southern Venturer*," some 600 tons of whale meat can be dealt with in 24 hours in special equipment,

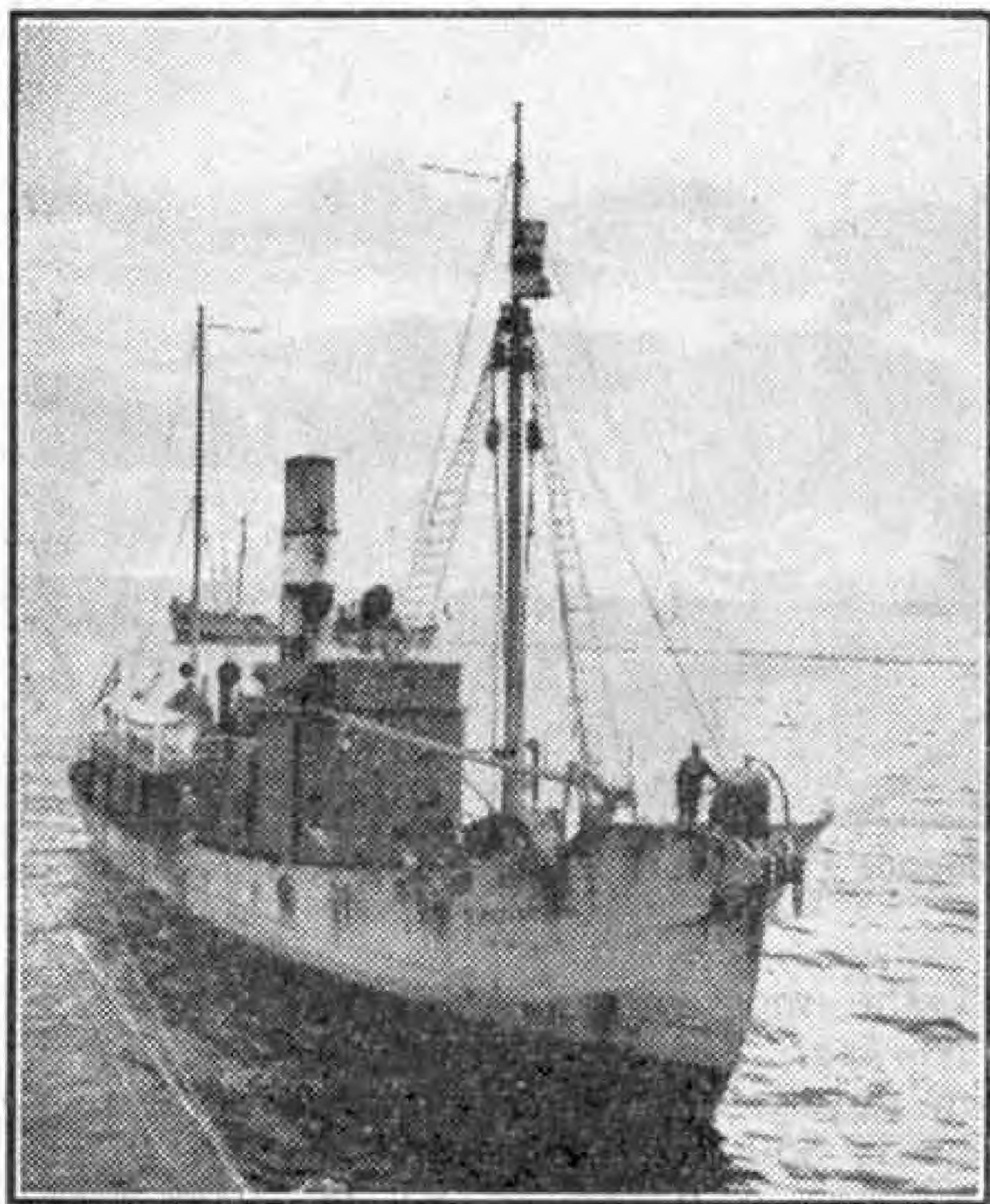


Firing the harpoon gun from the bow of a chaser.

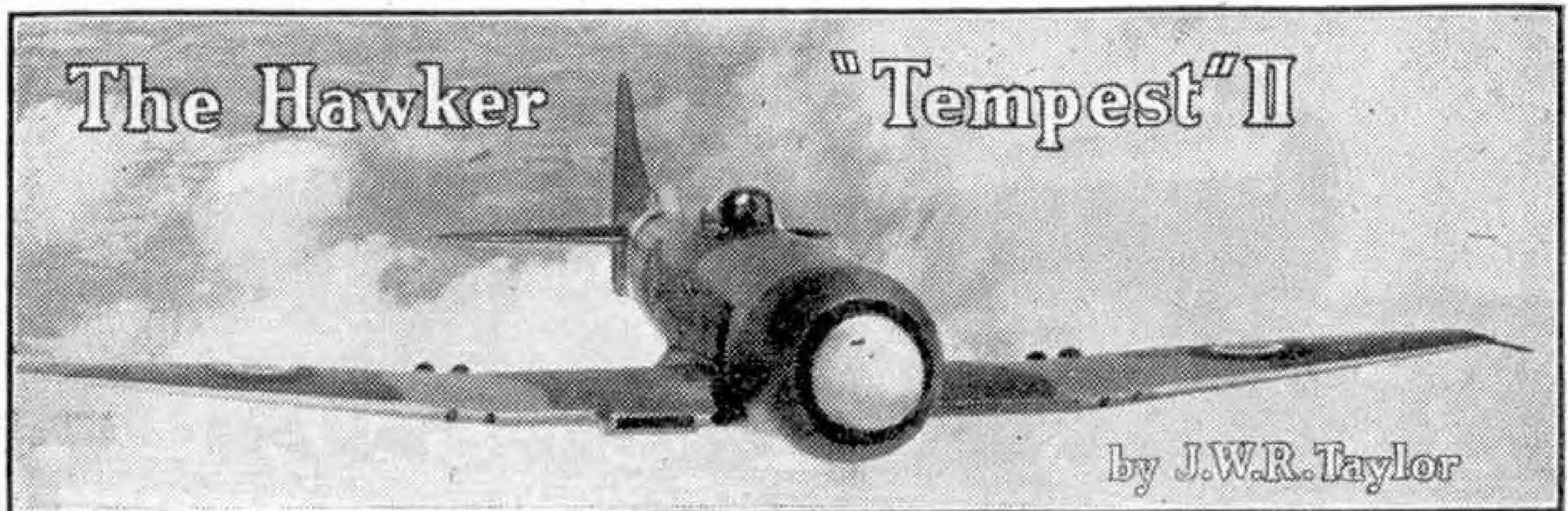
including sterilisers, steam-heated vacuum dryers, and plant for grinding the meat to meal. It is hoped that the final product, rich in protein and easily digestible, will prove of great value as a food for the peoples of Europe.

When the huge carcass is hauled on to the deck there begins the process known as flensing. This consists of cutting off the tough coating of blubber with long-handled, curved-bladed knives. Small winches slowly peel off the sheets of blubber, rather like the skin of an orange. After being chopped into smaller pieces, the blubber is fed into a hopper and thence reaches the boilers. Hours of high pressure treatment here and in the refining plant extract all the precious oil and purify it. Every part of the whale is made use of, the soft parts being boiled later to extract their oil content. Great bone saws get busy on the vast skeleton, with its huge skull and long backbone, and the crushed pieces are ground down and mixed with all the residue of the blubber processing, together with large quantities of blood and entrails. This makes a useful fertiliser. As can be imagined, the mess and stench are both appalling, but the men who work on the ships do not heed either.

Within two or three hours the whole carcass is disposed of, having been reduced to many tons of oil in the tanks and bags of fertiliser in the hold. The oil will reduce the prevailing shortage of fats and vitamins, for it is used for foodstuffs like margarine as well as for other products like soap, glycerine and lubricating oils. Truly this giant harvest of the deep is indeed rich and the hunters now busy are certain of bumper results.



The whale catcher "*Thorarin*."



BOTH in the air and on the ground the Hawker "Tempest" II gives an impression of tremendous power and speed. It is not a small aircraft, but its loaded weight of 11,800 lb., compared with something like 18,000 lb. for comparable foreign fighters, tells of the fine design and construction of this thoroughbred British aircraft.

Although a new Hawker fighter, the "Fury," will soon be in production, the "Tempest" II is still being built in considerable numbers in the vast Hawker factory at Langley. It has a fuselage of composite construction, with a tubular-strut "box" front structure and a monocoque from just behind the cockpit to the tail. One of the first things I saw when I visited Langley recently was a floor area of several hundred square yards covered with these monocoques, all standing upright on their front ends and looking rather like a Walt Disney forest.

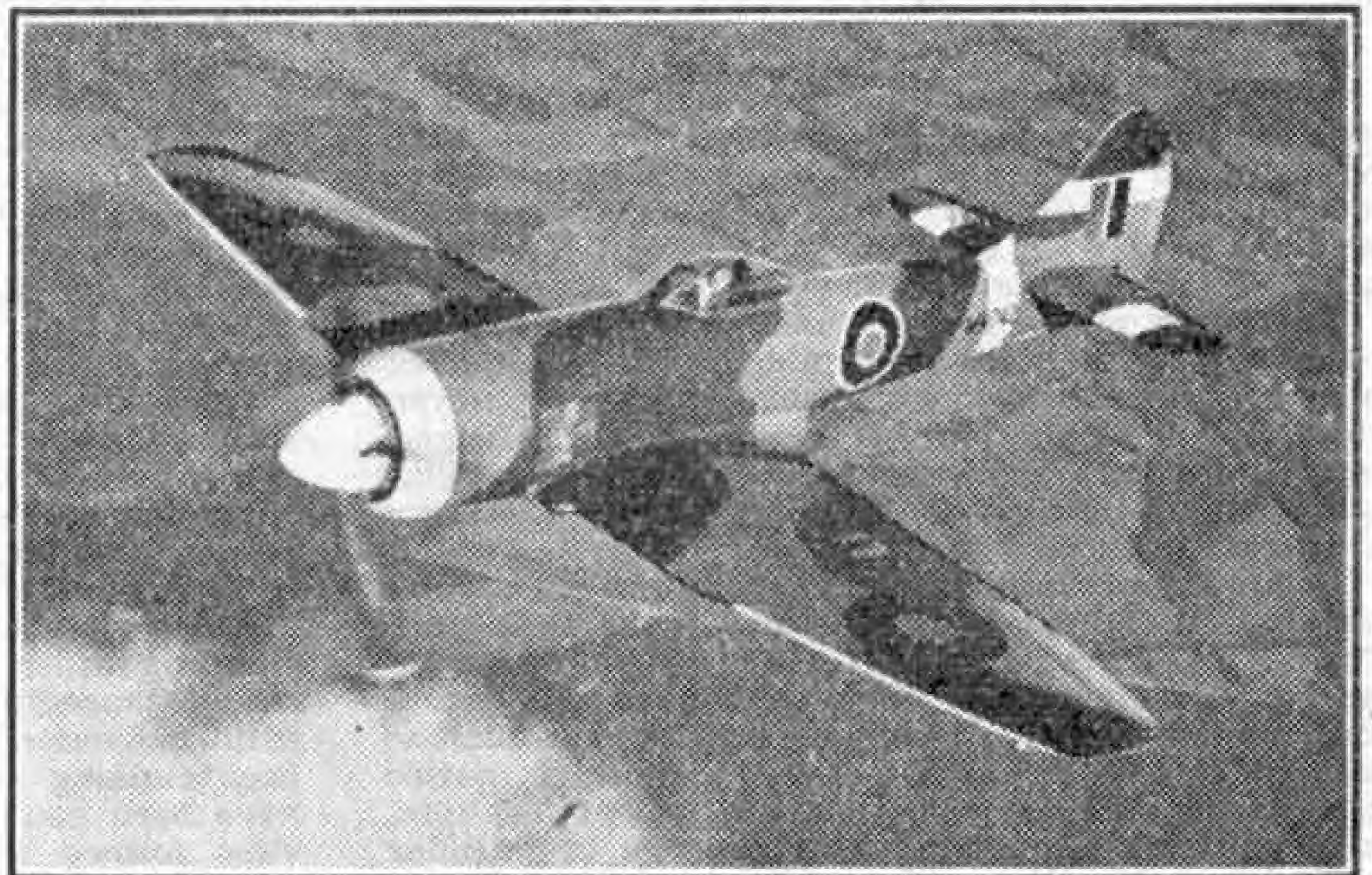
A little further on, workers were fitting the monocoques on to front fuselage assemblies, already complete with all the hydraulic, pneumatic, fuel, oil, electrical and other pipes, cables and controls, the pilot's seat and instrument panel—an orderly maze of components that makes one realise what a complicated piece of machinery is a modern fighter. In the next "shop" the 2,500 h.p. Bristol "Centaurus" V engines were being installed, enclosed in a neat cowling so close-fitting that it made the huge power plant look quite small.

In another part of the factory I saw rows of wings being made on massive jigs, and was told that although the "Tempest's"

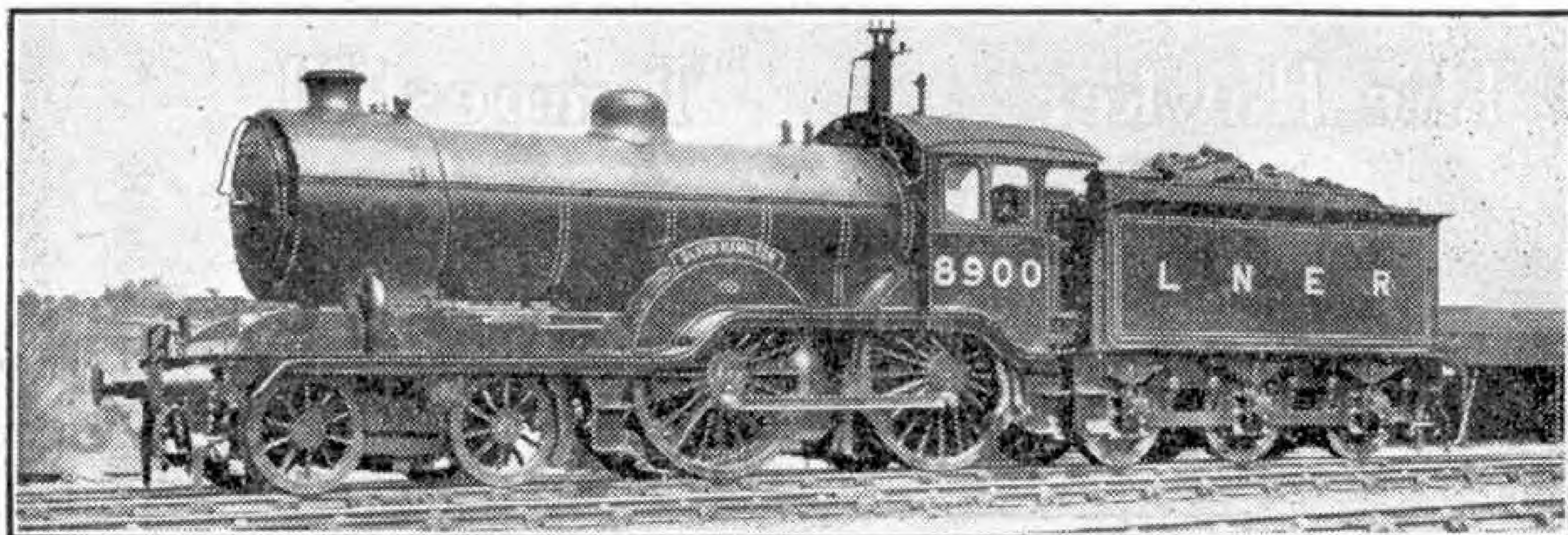
H 14/37.5 "thin" wing section is not a true "laminar-flow" section, it is even better for high-speed aircraft. The wing is, in fact, so thin that I almost felt like asking to meet the magician who waves his wand so that four large cannons with 636 rounds of ammunition, the aileron controls, 82 gallons of fuel, an oil cooler, the undercarriage and lots of other things can all be crammed inside. But I was assured that the only "magicians" were Sydney Camm, Hawker's chief designer, and his staff, who conceived the "Tempest's" semi-elliptical wing in the early years of the war.

On the final assembly floor I watched the wings and tailplanes being fitted to one fuselage, the guns aligned, undercarriage tested and the remainder of the operational equipment installed. Then the "Tempest" was wheeled out for its first engine run. As the engineer in the cockpit pushed two small buttons on the instrument panel the cartridge of the Coffman engine starter fired and the "Centaurus" burst into life, at first reluctantly and then with a roar that

(Continued on page 40)



Another view of the Hawker "Tempest" II fighter.



"Claud Hamilton," the pioneer G.E.R. 4-4-0 of a famous class, as rebuilt to L.N.E.R. class D16/3 and painted green in 1933.

Railway Notes

L.M.S. Locomotive Notes

Building continues of class "5" 4-6-0 mixed traffic engines numbered 49xx. Class "4P" 2-6-4T locomotives are also being turned out fairly rapidly; a new series numbered from 2200 upward, we are informed, has followed the completion of Nos. 2673-99. All but three of the 37 3-cyl. 2-6-4Ts were recently noted on the Tilbury and Southend section of the Midland division.

The Bletchley-Oxford and similar branches are happy hunting grounds for the remaining "Prince of Wales" 4-6-0s, including for instance No. 25673 "Lusitania" and No. 25818.

"Royal Scot" No. 6122 was noted going into Works for rebuilding with new taper boiler, double chimney and other modernisations already applied to 25 representatives of the class.

"Duchess" 4-6-2 No. 6251 was officially named "City of Nottingham" and on view in that city during October. A striking contrast was afforded by the presence in the vicinity of the veteran 2-4-0 No. 20002, that famous Kirtley sole survivor. Among locomotives of the old school lately condemned were former L. & Y. 2-4-2T No. 10729; ex-L.N.W.R. No. 6659 of the same wheel arrangement; and another of the ancient Webb coal engines, 0-6-0 No. 28187.

The First Post-War Continental Services

A service between London and Paris, via Newhaven and Dieppe, has been in operation for some time, having been the initial post-war ordinary passenger link with the Continent. "Atlantic" engines generally haul the boat train between Victoria and Newhaven, as in the days before 1939.

There are many specials and vessels running, in connection with leave or demobilisation for Forces' personnel, to and from Folkestone and Dover; nevertheless the restoration of a public Anglo-Belgian service on 22nd October last, the first of its kind using one of the famous Kent ports since 1940, was a notable occasion.

Following a naming ceremony at Victoria, in which the Belgian Minister of Communications took part, "Merchant Navy" No. 21C 17 "Belgian Marine" worked the inaugural boat express to Folkestone and made a fine run, gaining 5 min. on schedule and averaging fully 70 m.p.h. between Tonbridge, passed slowly, and Ashford. The load was about 340 tons, including three Pullman cars, the whole in gleaming new paint. Usually a "Schools" class 4-4-0 is employed for this duty, which operates three times a

week in each direction.

In the years prior to the war at least two vessels sailed daily between Dover and Ostend, the Belgian port now again concerned, and it is hoped in time to resume that frequency when Dover is not so fully occupied with Services' traffic, subject to Continental conditions becoming more normal.

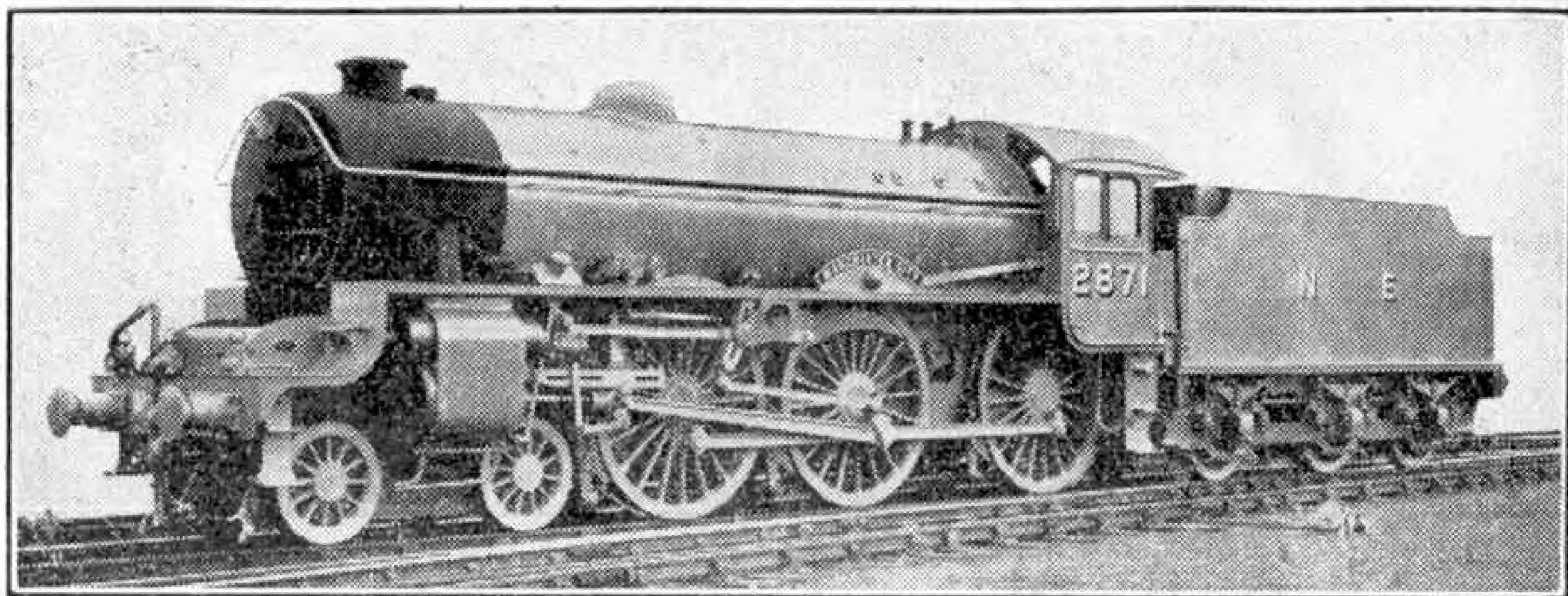
In November it was the turn of the L.N.E.R., Harwich, and the Netherlands authorities to celebrate the re-opening of the Parkeston Quay (Harwich)-Hook of Holland service. The beautiful train specially built for that run shortly before the war, with its cheerily lighted restaurant and saloon cars, was all ready at the customary platform at Liverpool Street to make the opening evening run to Parkeston, headed by a smart green locomotive of the new Thompson "B1" class, No. 8304 "Gazelle," which lately had been Royal engine at Cambridge. On account of limited accommodation and the shortage of food and living quarters in Europe, there are still certain restrictions on bookings from here to the Continent.

The Return of Travelling Post Offices

An old-established feature of railway operation, in conjunction with the Post Office, is the Royal Mail van attached to main line trains in which sorting is done by postal staffs during the journey. At many places letters are picked up or set down in pouches by means of a lineside apparatus while the train is travelling at speed, and large numbers of bags and hampers are loaded or unloaded at principal stopping stations. Just before war broke out 72 Travelling Post Offices, known as T.P.O.s., were running daily in Britain, many operating at night over long cross-country or main line routes, formed into complete postal trains or attached to ordinary passenger or parcel services, sometimes singly, sometimes with two or three vans on one train.

Perhaps the most famous British developments in this respect are the complete postal trains, the T.P.O. Specials, run nightly between Euston and Aberdeen, L.M.S., and on the G.W.R. between Paddington and Penzance. In the course of each Anglo-Scottish journey about 150,000 letters may pass through the sorters' hands, and pouches are exchanged by apparatus at 33 points.

On account of staff shortage, blackout regulations and so on, fully worked T.P.O.s disappeared at the beginning of war, but their brightly lit splendour has now returned to the L.M.S. and G.W.R. lines. Vans on other trains will gradually be restored as circumstances permit, thus accelerating intermediate mail deliveries. During the war mail vans have been running and huge quantities of postal matter have been conveyed by them as well as in luggage vans formed into ordinary or special trains, but no sorting has been done en route; loading or unloading has been carried out in bulk at stops only.



L.N.E.R. Class "B2" 4-6-0 No. 2871 "Manchester City," rebuilt from Class "B17" with two cylinders instead of three and boiler with higher working pressure. Photograph by courtesy of the L.N.E.R.

Another L.N.E.R. Conversion

Class "B17" 4-6-0 locomotive No. 2871, "Manchester City," has recently been modified in the Darlington Works of the L.N.E.R. by fitting two 20 in. by 26 in. cylinders standard with those of the "B1," "O1" and "L1" type engines. The inside cylinder, motion, and crank axle are dispensed with. The now standard "B1" type boiler, with 225 lb. per square inch working pressure, is fitted. The drive is taken on the middle pair of coupled wheels and the gear is arranged to cut off at a maximum of 75 per cent. The rated tractive power of the modified engine is 24,863 lb. as compared with the 25,380 lb. of the original three cylinder engine.

A "Claud Hamilton" is Withdrawn

The most numerous type of 4-4-0 on the L.N.E.R., or on any line other than the L.M.S., is the former Great Eastern "Claud Hamilton" series of 7 ft. express locomotives. Until a month or so ago there were 121 in service, numbered 8780-8900. The first one, built in 1900, was named "Claud Hamilton" in honour of the then Chairman of the company and was exhibited at the Paris Exhibition of that year, painted in the rich blue with much exterior embellishment that then made G.E.R. engines exceedingly attractive in appearance.

The class became known by the pioneer locomotive's name, but no others were named. Building took place gradually from 1900 to 1911, original numbering going backward from 1900, the first, to 1790. Just after grouping 10 more, numbered 1789 to 1780, were turned out in 1923. They took a very large share of principal main line work in the Eastern Counties until superseded by the "1500" 4-6-0 class, and afterwards were used for general or secondary work, undergoing considerable rebuilding or modification from time to time.

Descriptions of the development of this famous class have appeared, with illustrations, in the "M.M." from time to time. The latest development has been the provision of a Gresley round-topped boiler, instead of the Belpaire fire-box, with raised framing in front of the splashers, as shown in the photograph reproduced. No. 8866, so rebuilt, also having long-travel piston valves, is rather curiously the first to be withdrawn, but she had got in bad condition, with a cracked frame, and it may be some time before large inroads

are made by scrapping. Most of the "Clauds" now are either class "D16/2" with enlarged Belpaire boiler and superheater, or "D16/3," which indicates a Gresley rebuild.

Locomotive Performance on the S.R. Eastern Section

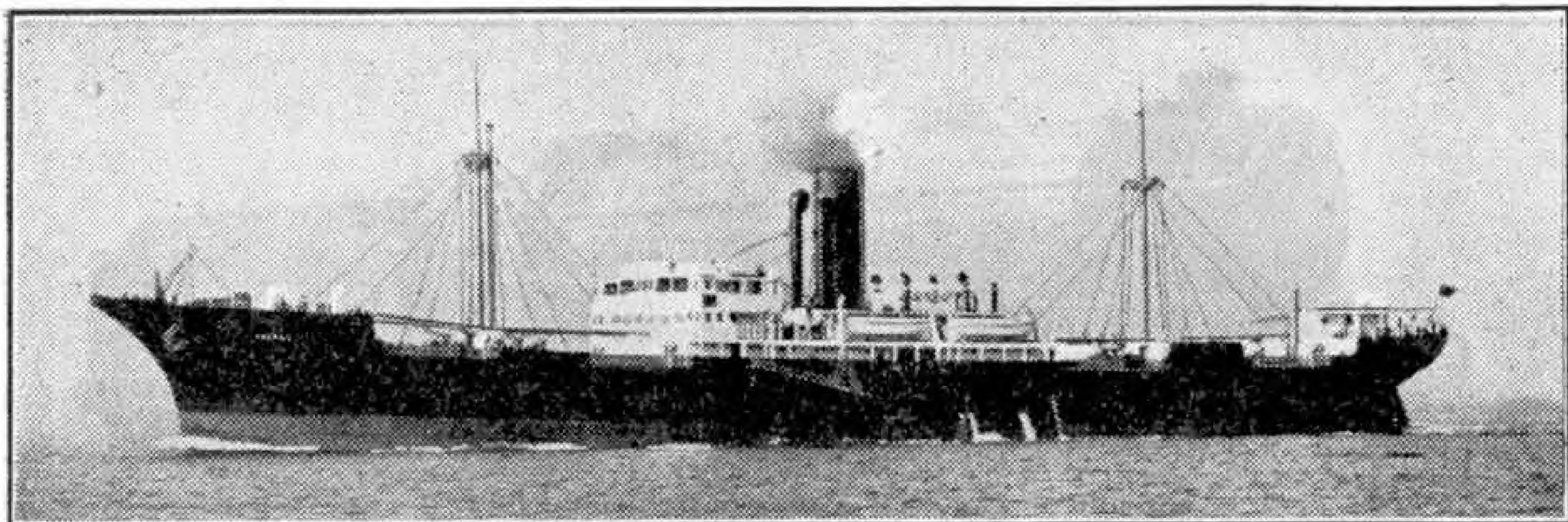
The Hastings direct line between Tonbridge, Tunbridge Wells and St. Leonards includes in its scenically attractive 31 miles much severe grading and curvature. Indeed the whole route from the metropolis, using the Charing Cross-Sevenoaks-Dover main line as far as Tonbridge, is one of the hardest 60 miles out of London in any direction, sharing this unenviable distinction with the Victoria-Chatham-Margate route, which is also part of the Eastern Section, S.R. Timings of the principal trains on the Hastings line have on the whole been little increased during the war. The difficulty of the road prevents any high average speeds from start to stop, though some of the bookings in actual practice are pretty tight if the load be nine or more coaches, particularly for up trains facing climbs at 1 in 100 or steeper calling at Crowhurst, Robertsbridge, the Junction with the Kent and East Sussex Railway, and Tunbridge Wells. They are indeed often beyond the powers of the "L" or "L1" 2-cyl. 4-4-0s suffering from wartime lack of maintenance, and require smart running by one of the large 3-cyl. "Schools," the standard type for the route, though not available in sufficient numbers in present conditions.

* * * * *

S.R. 4-6-2s 21C14 and 21C15 are named respectively "Nederland Line" and "Rotterdam Lloyd."



S.R. "Schools" class No. 902 "Wellington" on a down Hastings express approaching St. Leonards. Photograph by H. S. G. Darke.



Bulk Phosphate Carriers

By Denis Rebbeck, M.A. (Cantab.), A.M.Inst.C.E.

IN the year 1900 there started a very important trade from the Pacific when deposits of phosphate were discovered on Nauru, or Pleasant Island, and shortly afterwards on Ocean Island. These islands, which at that time belonged to the Germans, were scientifically surveyed, and as a result it was estimated that there were deposits amounting to 100,000,000 tons of first-class fertilising material. The German Government agreed to transfer the rights to the Pacific Phosphate Company Ltd., which was registered in April 1902 with an Anglo-German board of directors; this company proceeded to work phosphate deposits in Nauru, Ocean Island and Clipperton Island; they employed chartered tonnage and yielded good profits for many years.

In 1913 350,000 tons of phosphate were exported from Nauru and Ocean Island, and the importance of these islands led to their being seized at the outbreak of the 1914-18 war by H.M. Australian cruiser "*Melbourne*." The enemy-owned shares were auctioned by the Public Trustee in 1917, when they were purchased by Elder Dempster and Company Ltd. After the war the mandate for the administration of the islands was held jointly by Britain, Australia and New Zealand, who bought the phosphate rights of the Pacific Phosphate Company for £3,500,000 and transferred them to the British Phosphate Commissioners in proportion to the holding of the three Governments. Parliament passed an Act authorising this in 1920 and the production of phosphate was allocated in proportion to the holdings: Britain and Australia each had 42 per cent. and New Zealand 16 per cent.

Special steamers were then built for the

work, the first being the 2,934 ton "*Nauru Chief*," completed in 1921 for the British Phosphate Commissioners, and intended to carry the Australian and New Zealand proportions of the output.

The work of loading the ships was for many years done by lighters, but in 1923 it was proposed to instal jetties at both Nauru and Ocean Island in order to reduce the high costs. After some years' delay the mechanical plant for both islands was ordered in England, conveyors taking the phosphate from the quarries on Nauru to the shore where storage sheds were erected. Huge cantilevers, which swing their arms 200 ft. over the sea, were installed, and each unit handled 300 tons an hour; while a 350 ft. jetty, together with new handling plant, were ordered for Ocean Island.

In 1931 the second special vessel, a single-screw triple-expansion steamer, was built by Harland and Wolff Ltd.; this was the 11-knot 4,412-ton "*Triona*," seen in the accompanying illustration. In addition to her cargo facilities this vessel had special arrangements for lifting and laying the heavy deep-sea moorings, over a bow which was fashioned on that of a cable ship and which can be seen in the photograph. The "*Triona*" was followed in 1935 by the "*Triaster*," of 8,000 tons dead-weight with a speed of over 13 knots; but latterly Messrs. Carpenter and Company, of Sydney, a firm well known in the Pacific copra trade, purchased several fine cargo vessels and fitted them out specially for this arduous work, while many other ships of a more general type, notably those of Messrs. Andrew Weir and Company, were very frequent visitors to the islands to load cargoes of phosphate.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller. We can supply copies to readers who are unable to place orders in this manner. Order from Book Department, Meccano Ltd., Binns Road, Liverpool 13, adding 6d. for postage.

"OUR RAILWAY HISTORIES"

By V. BOYD-CARPENTER and T. PEARSON (5/6)

It is not easy nowadays to strike a new note in a book on railways or model railway subjects. This, however, has been done most successfully by the joint authors of "Our Railway Histories," who give fascinating accounts of their respective miniature railway systems.

A very attractive feature of the book is the story of the evolution of his miniature railway that each of the authors gives. Both lines have passed through the usual phases, including change of gauge, for years ago a great deal of equipment was available in larger scales than are usually employed now. Both too have seen changes in motive power; steam, clockwork and combined working have given place to electricity, with its remarkable facilities for remote control. Various systems of electrical working have been put to practical test, and it is particularly interesting to read of Mr. Boyd-Carpenter's trial of two-rail traction. This gave a track that looked well, but for reasons admirably stated in the booklet it proved impracticable and the owner promptly reverted to three-rail traction, a step that in the light of later experience he is convinced was right.

In part I of the book the story is told of the Gauge 0 "Lyonesse" Railway owned by Mr. Boyd-Carpenter. This serves the fabled land of Lyonesse, supposed to be to the west of Cornwall, but still a part of the mainland, by means of a branch from the G.W.R. at Penzance to St. Just and so into romantic Lyonesse to "Tresco." A complete story has been built up to account for the line and its traffic which is worked by the G.W.R. with their standard equipment. Apart from the main features, which are of a very high order, the engines and rolling stock are extraordinarily complete in detail. This completeness of detail embraces practically everything to do with the line, for in addition to a map of the system and extracts from the properly prepared and printed working timetables, the Lyonesse Railway also has its own coat of arms.

A complete table is given of all the engines and stock and the description concludes on a familiar note as to the rarity of a house designed expressly for the accommodation of a miniature railway system.

Part II deals with the "North Midland Railway" of Mr. T. Pearson, the title being taken from that of one of the constituents of the old Midland Railway. The present day North Midland is an 00 gauge line, and the owner can surely claim to be one of the pioneer workers in this scale, which he has employed since 1925, when such commercial products were few and far between. A map shows the railway to be based on "Tapton City," and connected to both the L.M.S. and the L.N.E.R., the Derby-Leeds Line on the one hand and the Retford-Sheffield line on the other being the sections concerned. Abundant "local colour" is provided in the story and surroundings of the railway, and the scenic, architectural and engineering features alike are an inspiration to the experienced and to the beginner. Almost every feature of railway operation is included, even to the connection with steamer services maintained by

an actual vessel which moves down a model river, and is berthed at the riverside station of "Port Dickshy." Great thought and care have obviously been expended in every direction in the equipment of the line, and a remarkable feature is the amount of construction that has taken place in the company's own works.

The illustrations throughout both parts of the book are of a very high quality. The book can be obtained from the authors at Launt House, Worksop, Notts., price 5/6. The whole of the proceeds is being devoted to various real railway charities, and anyone who desires may forward a larger sum than the published price. Such extras will be specially acknowledged.

"THE OBSERVERS' BOOK OF DOGS"

By C. L. B. HUBBARD (Warne, 4/- net)

All boys love dogs and most of them would like very much to learn more about the almost countless varieties. An opportunity of doing this is provided by Mr. Hubbard's book, one of the series of Observers' Books published by Frederick Warne and Co. Ltd. It shows the dog family to be remarkably extensive, for 300 breeds and varieties are dealt with, all of them selected for their usefulness,

appearance and habits. The arrangement is alphabetical, so that particular breeds can easily be found, and a whole page is devoted to each of these. An excellent and characteristic photograph introduces each breed dealt with, after which concise information is given of its origin, with other interesting features, such as size, general appearance and desirable standard features. Wild dogs and breeds of lesser importance also are dealt with in shorter form, and there is an excellent glossary of technical terms in common use and an index. This is a valuable book for the dog lover.

"OUR RAILWAY HISTORY"

By RIXON BUCKNALL (15/- net)

Mr. Bucknall's book on British railways has previously been published in three sections, which we reviewed at the time of their appearance. Now the author has combined these sections into a single volume, with much additional information and new illustrations. There is also an excellent large scale railway map.

For the benefit of those who are not familiar with Mr. Rixon's production we add that the book is concerned with the principal British railway systems prior to the grouping of 1923. In each case the origin of the line is explained, and its history is traced right down to the time of grouping, details being given of the evolution of both locomotives and coaches, with interesting notes on the famous railwaymen associated with it. Characteristic practices are described and there is a wealth of detail that helps us to understand the traditions of pre-grouping days. The stories are readable and will be of absorbing interest to modern boys as well as to those who remember something of the pre-grouping railways. They are well illustrated by an excellent series of full page and half page reproductions of attractive photographs, many of which are rare.

Copies of the book can be obtained from him at 48, Woburn Place, London, W.C.1, price 15/8 post free.

Owing to difficulties due to the war, it is impossible to guarantee prompt delivery of books ordered as described above.

Every effort, however, will be made to ensure speedy despatch.

Ladybower Reservoir

Britain's Largest Earthwork Dam

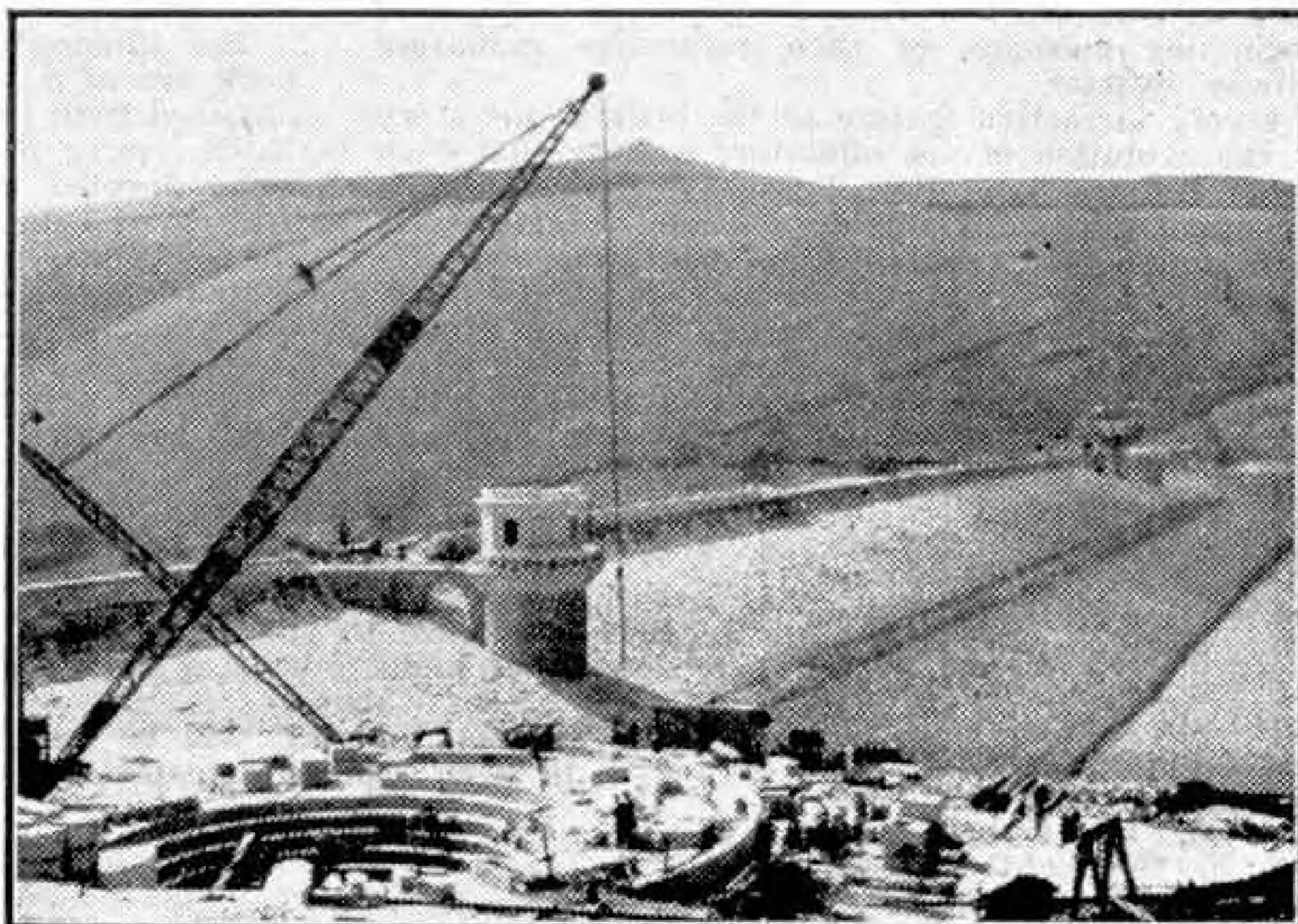
By F. Rodgers

WORK on the construction of a huge reservoir in the Derwent Valley, Derbyshire, was started 10 years ago, and in September 1945 the King set the seal on its completion by officially opening it. The Ladybower Reservoir, as it is called, is the largest artificial reservoir formed by the construction of an earthwork embankment in the British Isles, if not in Europe.

When work was started in 1935, the difficulty of preventing water percolating through the rock beneath the dam, and through the hills on each side, was the first to be faced, for these hills of millstone grit have many fissures in them. It was necessary to sink a trench 1,250 ft. long, 6 ft. wide and with a maximum depth of 255 ft., straight across the valley, and this cavity cut from the rock was then filled with concrete. While this gigantic task was being done, the river continued to flow along its natural bed, for the trench was cut beneath the river, thus leaving a natural rock bridge.

To prevent the waters of the full

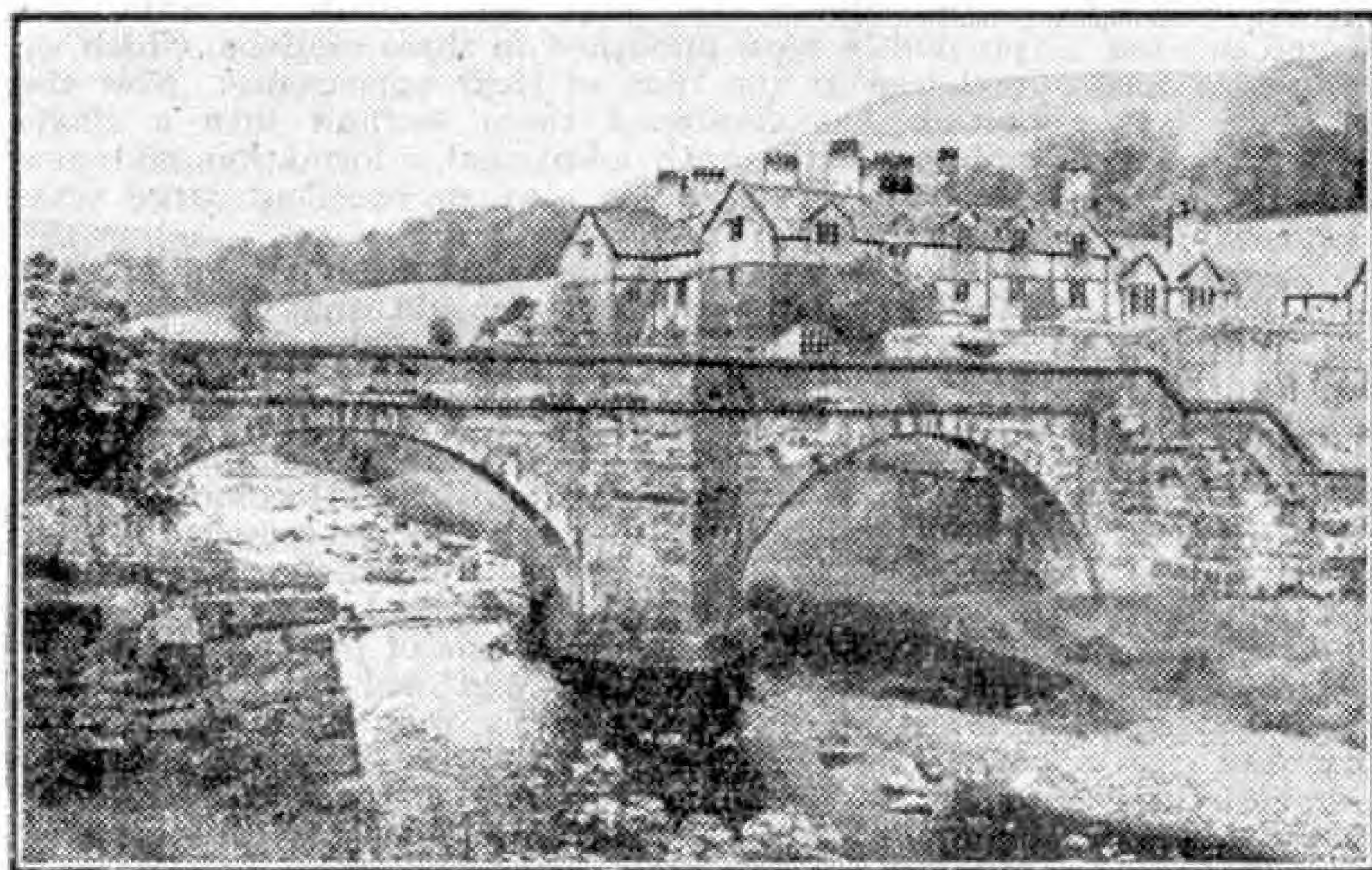
reservoir seeping through the hillsides and thus passing round the dam, boreholes were driven on both sides, and cement grout was forced in under pressure



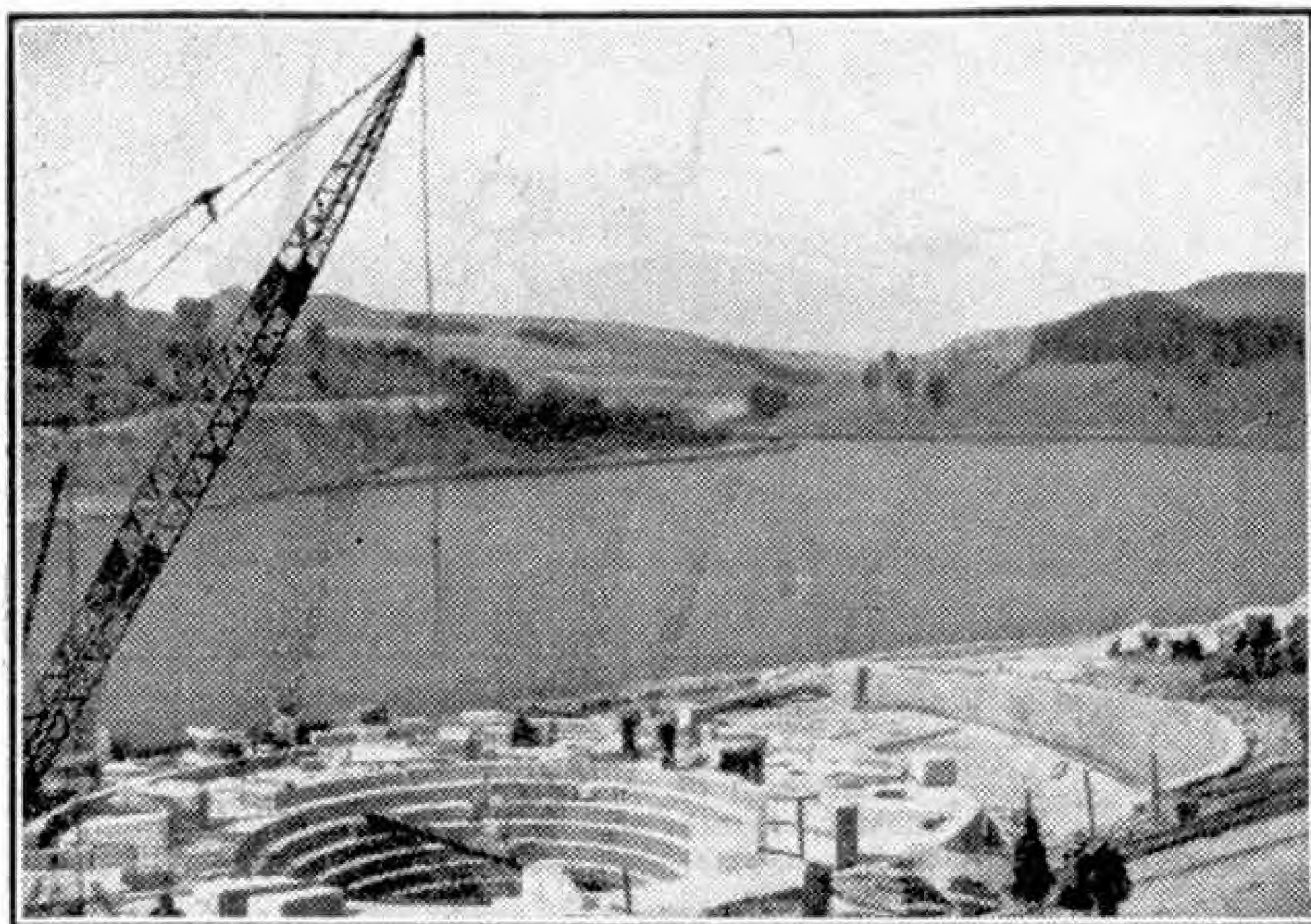
The earthwork dam of Ladybower Reservoir. The overflow seen in the foreground had a casket built into it by the King, who also operated valves from the tower.

to fill up any fissures in the rock. The total length of these holes was 8 miles and the deepest went down 400 ft. No less than 13,000 tons of concrete was forced into the rock.

Then the building of the dam was begun. This is an embankment 1,250 ft. long, tapering in thickness from 665 ft. at the bottom to 17 ft. at the top, with a height of 150 ft. A million tons of earth, taken chiefly from the valley to be flooded and thus increasing its capacity, 100,000 tons of clay and a further 100,000 tons of cement were used in the building. As the embankment is of earth, excess water cannot be allowed to flow over the top; when there is any it will fall into two overflows each 80 ft. in diameter, to be carried beneath the dam



The 17th Century packhorse bridge and the hall of Derwent Woodlands.



Beneath these waters lies the village of Ashopton.

through tunnels with a diameter of 15 ft. The King laid a stone on the overflow shown in our illustration, after placing a casket in the cavity beneath. In this casket there is a copy of *"The Times,"* a set of coins of the realm, and a brochure showing the construction of the reservoir. From the tower seen in the same illustration the King then operated valves that released water into the river far below.

The filling of the reservoir began in 1943, and when this is completed it will have a surface area of 504 acres and a maximum depth of 135 ft. Its shore will be 13 miles in length. The capacity will be 6,300 million gallons, and together with water from the two existing reservoirs in the valley, the Derwent Valley Water Board will be able to supply 37 million gallons daily to Derby, Sheffield, Leicester and Nottingham.

The reservoir when full will have four arms, for Woodlands Valley, which drains a large part of Kinderscout, and the valley down which flows the Ladybower Brook join the Derwent Valley at the same spot. The main roads that followed the courses of the rivers flowing down the valleys are submerged, and over five miles of new roads have been constructed at a higher level on the hillsides. As these main roads must cross the arms of the reservoir at two

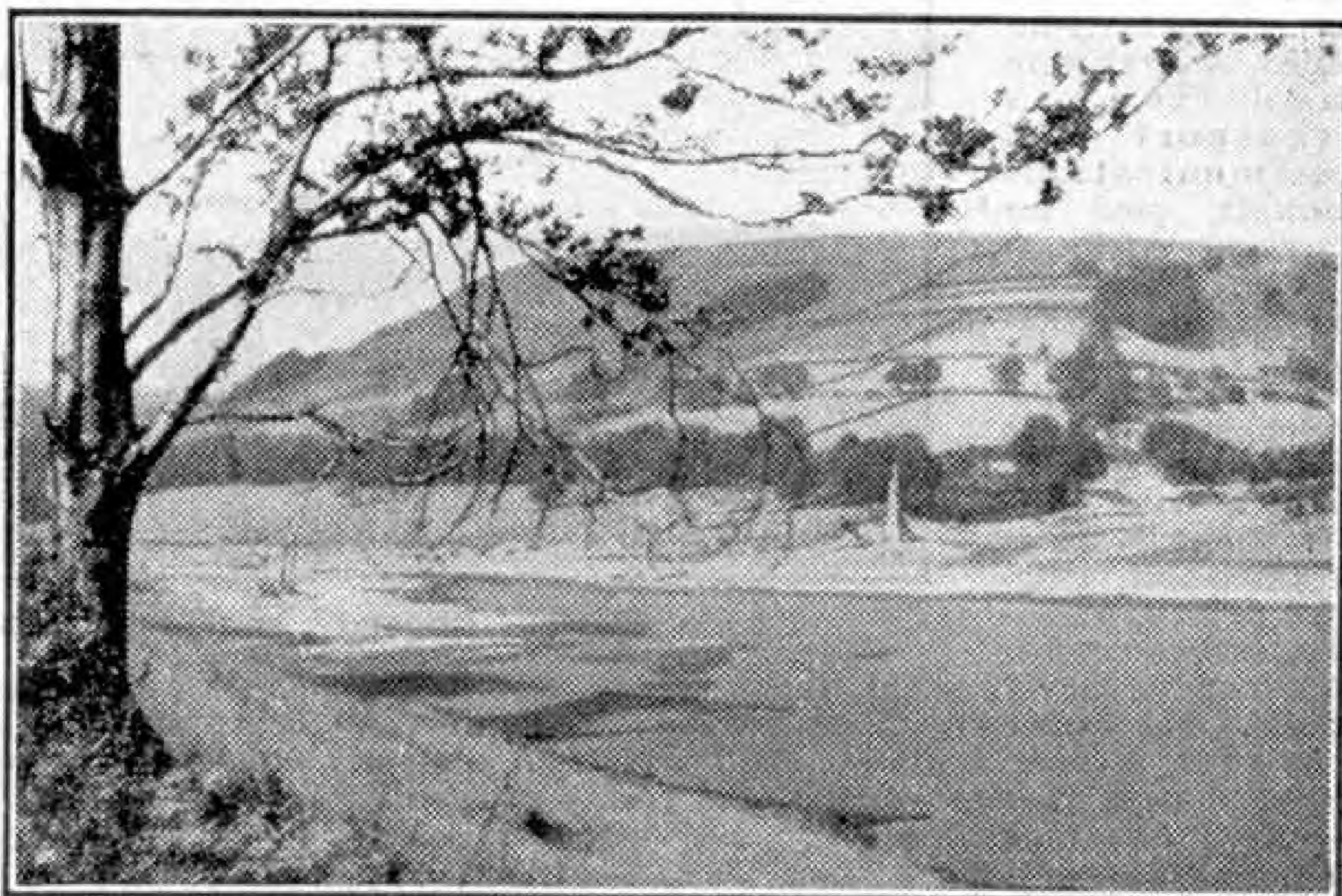
points, they are carried on huge concrete viaducts, the Ashopton and the Ladybower, and these also carry water mains and Post Office cables.

The valleys were denuded of trees, and many farms and two whole villages have disappeared. One of these, Ashopton, complete with chapel, inn, bridge and picturesque cottages, now lies beneath the water. Of the village of Derwent Woodlands only the tower of the church has been left, and when the reservoir is full the tip will show where once stood the village. The

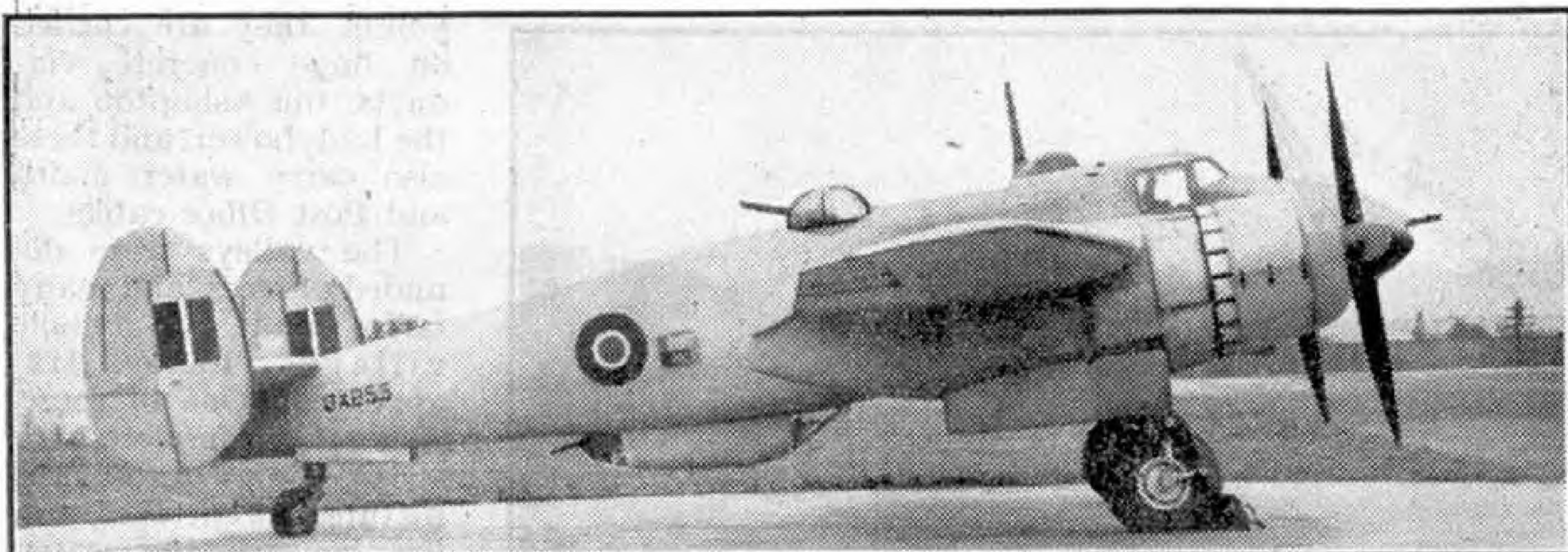
bodies in the churchyard were removed to a neighbouring village, and the stained glass and font saved. A fine hall, once the home of the Dukes of Norfolk and later one of the Y.H.A.'s finest hostels, has been demolished.

A 17th century packhorse bridge on the site of the reservoir has been carefully taken down and each stone marked, for it is to be re-erected at another spot over the Derwent in memory of a Sheffield Rambler, John Derry. Standing high on the hillside overlooking the village, which is now no more, is the fine war memorial cross, removed from the centre of the village to a new and more exalted position.

Large plantations of firs have been established on the hillsides, to become mirrored later in the deep waters.



The tower of Derwent Woodland's Church seen in the valley awaiting the rising waters.



Bristol "Buckingham" medium bomber, designed as a successor to the "Blenheim" and "Beaufort" types.

Air News

New British Aircraft

Last month's "Air News" included details of some of the new types of British aircraft recently taken off the secret list. Other new British machines similarly disclosed are dealt with in the following notes.

Bristol Aeroplane Co. Ltd.

Three new Bristol aeroplanes can now be mentioned, the "Brigand" torpedo-fighter, the "Buckingham" medium bomber and the "Buckmaster" trainer. The basic design for all three was the "Buckingham," shown in the upper illustration on this page, which was intended as a successor to the "Blenheim" and "Beaufort" as a very long-range day bomber, with two "Centaurus" engines, for service in the Far East. An unusual feature of this machine was the bomb-aimer's position under the fuselage, aft of the bomb-bay, somewhat similar to that on the Heinkel 111K. A machine-gun was mounted in the rear of this "blister" for firing backwards under the tail. In addition there was a two-gun turret above the fuselage and four more guns in the nose. The "Buckingham" did not go into operational service as a bomber; instead, several were modified as transport and communications aircraft, used for carrying V.I.Ps.

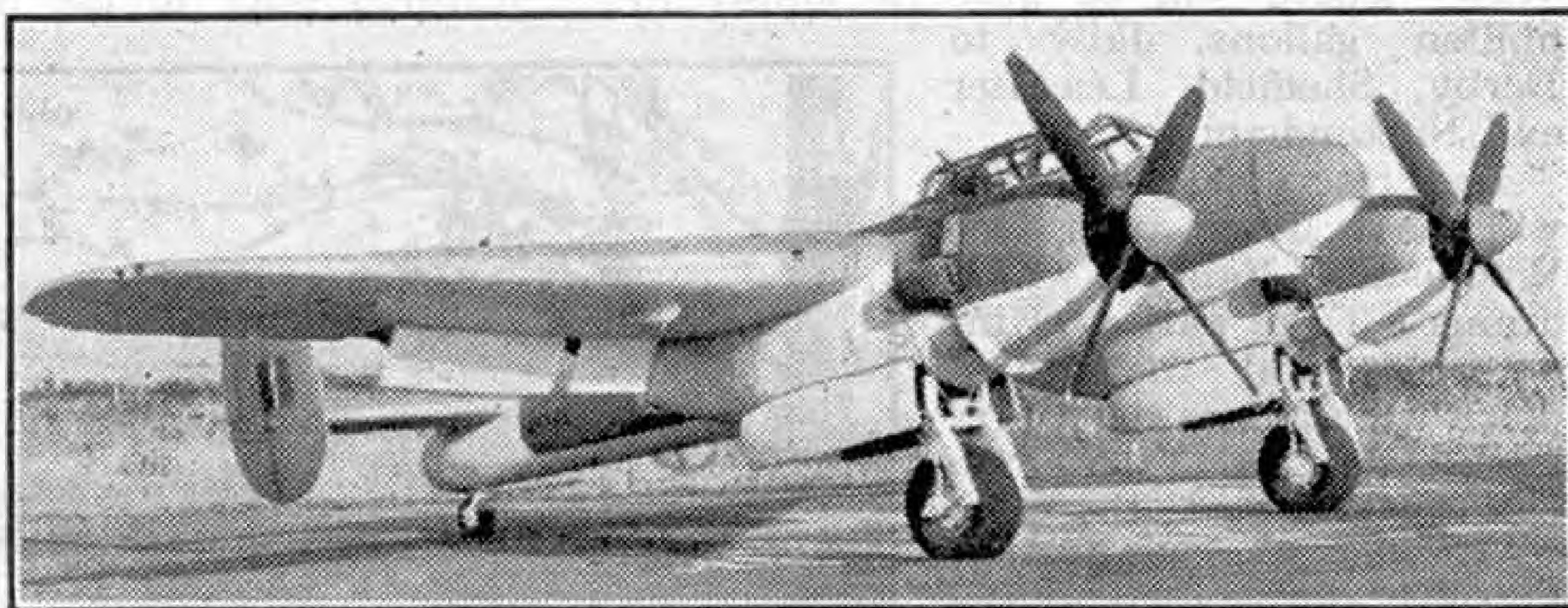
The "Brigand" bears approximately the same relationship to the "Buckingham" as did the "Beaufighter" to the "Beaufort." It is a three-seat, long-range torpedo-fighter dive-bomber designed for day or night duties in any part of the world, and can carry a heavy load of bombs or torpedoes, as well as its standard armament of four forward-firing 20 mm. cannon, and rocket projectiles or drop fuel tanks for long-range operations. The two "Centaurus" 57 engines give it an excellent performance, and there is no doubt that it would have proved a worthy successor to the ubiquitous "Beaufighter" had the war continued.

The third of the new Bristol aircraft, the "Buckmaster," is more or less a de-militarised "Buckingham" and is used as an operational trainer for "Brigand" aircrews.

Handley Page Limited

The most unorthodox of the new British aircraft is the little Handley Page "Manx" twin-engined tailless monoplane. It was built for flight research experiments in connection with the development of tailless aircraft, and its 140 h.p. de Havilland "Gipsy Major" engines are mounted in the trailing edge of the wing. It is a two-seater with a wing span of 40 ft. and a loaded weight of 4,000 lb. The wings are swept back at a large angle each side of the egg-shaped fuselage and the fins and rudders are mounted at the extreme tips. The ailerons, which also serve as elevators, are known as elevons. An unusual feature is that only the main wheels of the tricycle undercarriage are retractable, as it was not considered worth-while fitting complicated nose-wheel retracting gear to a machine with a top speed of only 150 m.p.h.

The results of the flight trials proved conclusively that the lower structure weight obtained by dispensing with a tail unit enabled more payload to be carried, and the "Manx" has good handling qualities both in the air and on the ground. Obvious advantages of the tailless layout are unrestricted field of fire rearward for military types and easier loading through

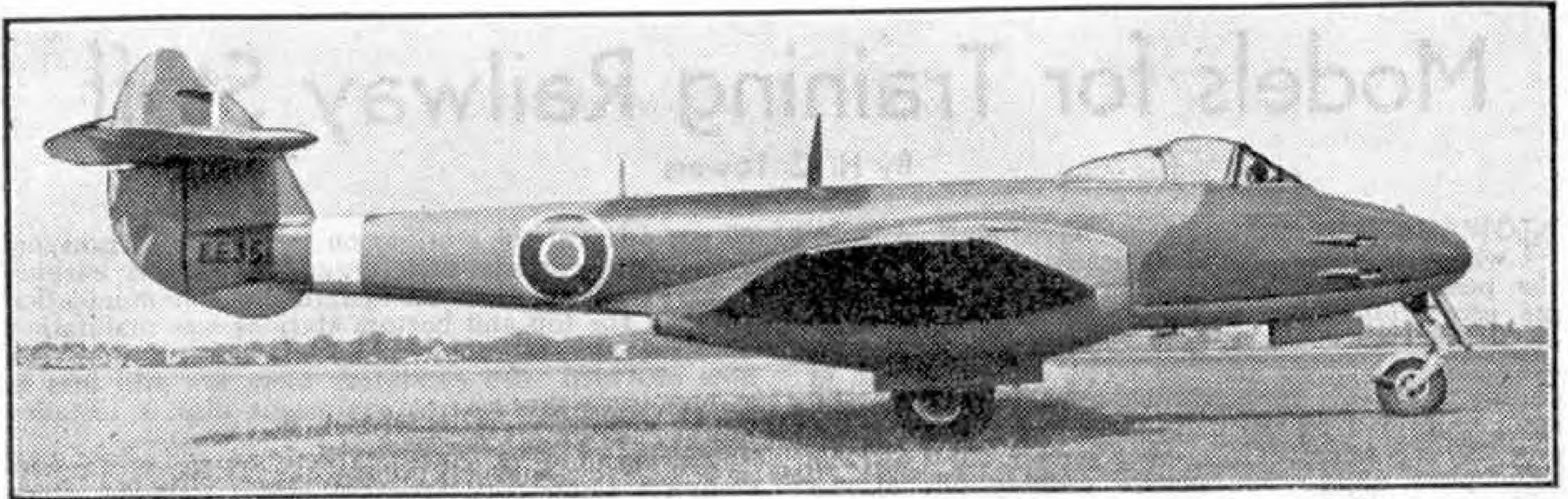


Bristol "Brigand" long-range torpedo-fighter dive-bomber.

the rear end of the fuselage for civil machines. In fact it seems probable that a two-seat jet-fighter developed from the "Manx" would be a very attractive proposition.

J.W.R.T.

Three Douglas DC-6 and two Lockheed "Constellation" air liners have been ordered by Pan-American Grace Airways.



The sleek lines, short undercarriage and unusual tail unit of the Gloster "Meteor" I jet-propelled fighter are well shown in this photograph.

"Vampire" Jet Fighter lands on Aircraft Carrier

A D.H. "Vampire" made history on 4th December last by being the first jet-propelled aeroplane to land on an aircraft carrier. The machine was flown by Lieut.-Cmdr. E. M. Brown, M.B.E., D.S.C., R.N.V.R., chief Naval test pilot, and the landing was made upon the flight deck of the 14,000-ton light carrier H.M.S. "Ocean" as she steamed off the Isle of Wight. After circling the carrier and heading into the wind the "Vampire" came in at 95 m.p.h., and after picking up the first arrestor wire on the deck stopped within 100 ft.; a perfect landing.

The Springbok Service

The through mail and passenger service to South Africa inaugurated by Imperial Airways in 1931 and operated with Empire flying boats until 1940, was restored by British Overseas Airways on 10th November last year. The present service is operated once a week each way jointly with South African Airways, with Avro "York" transport.

Each "York" has accommodation for 12 passengers in addition to mail and cargo, but at present only sponsored passengers will be carried, as the service is so limited. The fares are £167 single and £301 return. The route is from Hurn, through Castel Benito in North Africa, Cairo, Khartoum, Nairobi

and Johannesburg, the journey being scheduled to take 68 hrs. 40 min., although the actual flying time is only 32 hrs. 25 min. for a distance of 6,835 miles. The return journey takes 62 hrs. J.W.R.T.

Boeing "Stratocruiser" to have Reversible Propellers

Reversible propellers capable of providing additional braking action on the ground will be used on the 4-engined Boeing 377 "Stratocruiser." The new reverse thrust "props" will enable this 64-ton, 114-passenger air liner to land in less distance than is now required for single-engined fighters. Once the machine touches the ground the angle of the propeller blades may be reversed, exerting a force backward similar to that normally produced forward when in flight, and helping the wheel brakes to bring the huge air liner to a gentle but speedy stop. Landings on an icy field are simplified, as the reversible propeller, using aerodynamic force for braking, is not dependent on ground friction for its effect.

Reversible propellers were fitted to the Boeing B-29 "Superfortresses" on their atom bomb missions over Japan. Their installation was ordered by the U.S. War Department in anticipation of a possible emergency landing on a short field.

The "Stratocruiser" is a 340 m.p.h. post-war "brother" of the famous "Superfort," and an illustration of one appeared on page 434 of last month's "M.M."

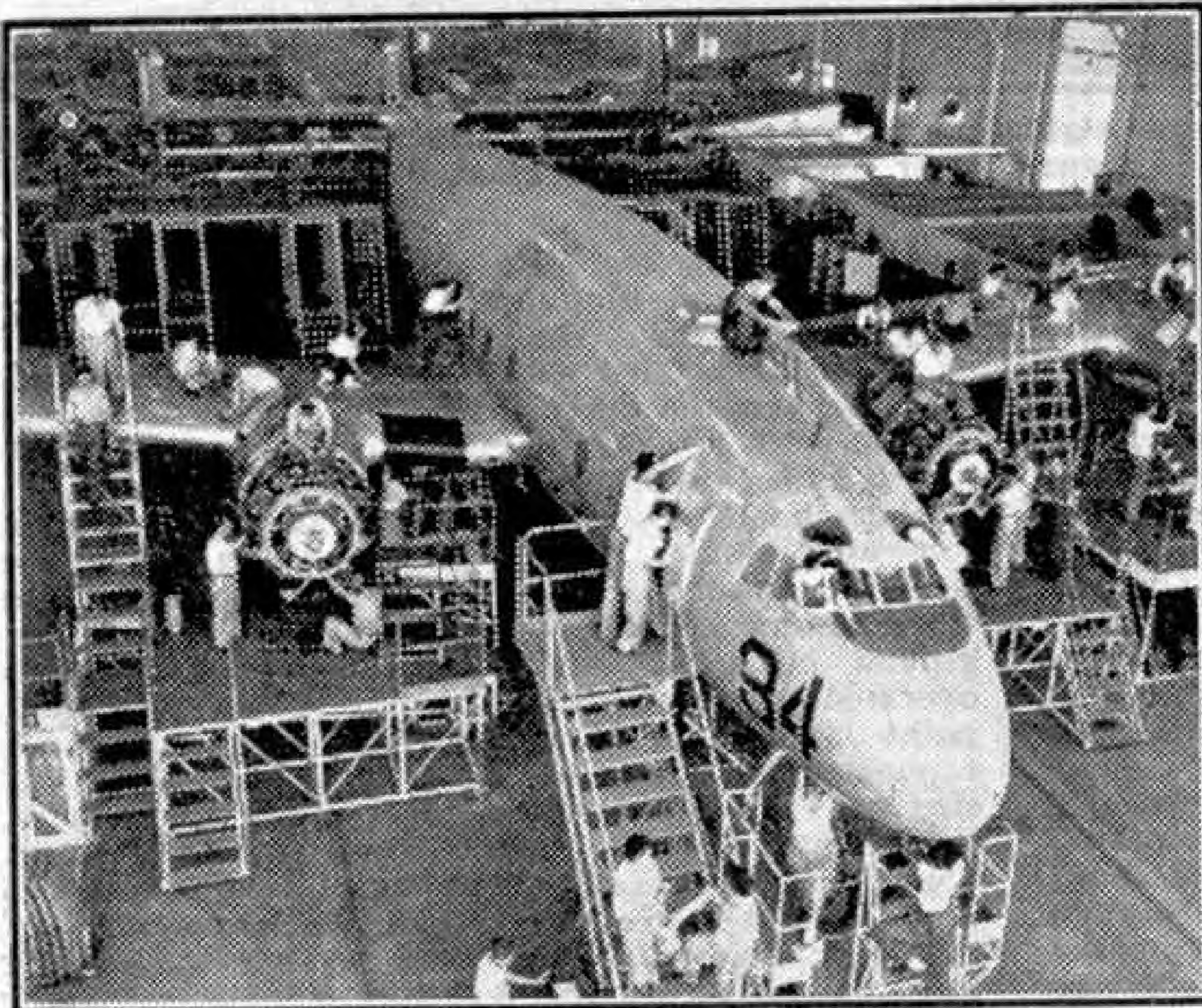
"Sunderlands" for the Argentine

The launching of the "Sunderland" flying boat "Argentina" on 1st November 1945 by Sra. de Dodero, wife of the chairman of the shipping line Compania Argentina de Navegacion Dodero, marks a fine beginning for Short Brothers' post-war export business.

Four of these civil "Sunderlands" have been ordered and will be used to operate services up the River Plate to Corrientes, and also, eventually, from Natal to Bathurst. They are equipped to carry 40 passengers in luxurious cabins, and have five additional seats in the refreshment compartment on the upper deck, which may be used as ordinary seating accommodation on crowded routes. The interior of the aircraft is decorated with pale blue washable Vynide, with upholstery, curtains and carpets to match. Each passenger has individual lighting and ventilation, in addition to the normal cabin-heating system. The civil "Sunderlands" have a maximum speed of 240 m.p.h., and a range in still air of 2,500 miles at a speed of up to 200 m.p.h. Fully loaded they weigh 60,000 lb., which includes more than a ton of freight or mail.

All four "Sunderlands" will be flown out to Argentina by B.O.A.C. crews.

J.W.R.T.



The Lockheed factories at Burbank, California, are now mainly engaged in producing commercial aircraft, and this view shows the big 4-engined "Constellation" air liners under construction. Photograph by courtesy of Lockheed Aircraft Corporation, U.S.A.

Models for Training Railway Staff

By H. C. Towers

NOWADAYS most railways have staff colleges where their men attend classes on specific subjects, the passing of an examination rendering them fit for promotion to a higher grade when vacancies occur. The best school is practical experience, but even this should go hand in hand with a system of regular training. For example, a man with practical training gained by working at various stations may one day be sent out on relief duty. This he may accomplish quite well because nothing out of the ordinary is likely to occur; but if an emergency arises, such as a train running away, a collision or a derailment, he may completely lose his head. Psychology has a great deal to do with this, but it is probable that a man who knows what to do is not so liable to become unnerved as a man who is improperly trained.

As an example of thoroughness, the London Passenger Transport Board maintain very complete schools for staff training. At the omnibus school drivers-designate have to attend daily classes, the syllabus of which covers automobile engineering, general knowledge of London streets, elementary law, etc., while the practical course covers actual operation of vehicles of all types. The final test, in which all the geographical features of a typical street are reproduced, including islands, bus stops and traffic lights, is carried out on a treacherous road surface capable of producing the most terrifying skids. Even after passing this test new drivers are not allowed to operate on a traffic route unless accompanied by an experienced driver, and this continues for perhaps a week or more. Bus conductors also are trained in this school. Their training mainly covers schedules, fares, mental arithmetic, etc.

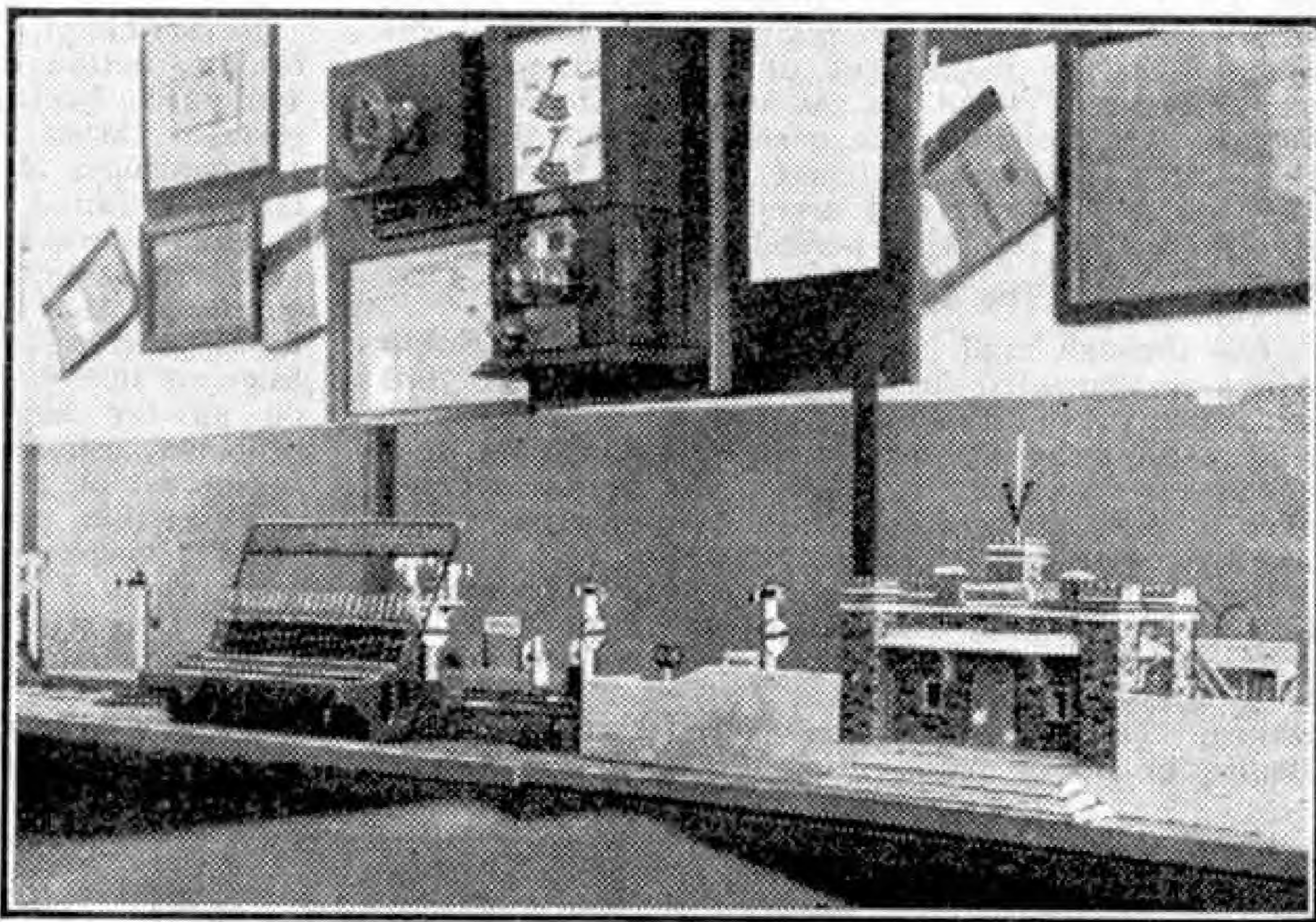
The railway portion of London Transport has two schools, one at Lambeth North Station and another at South Kensington, the latter being the Signal Department staff. The central employment bureau and training school at Lambeth North was established in 1920, and during the two decades that have passed many improvements have been made. Just before the war it was intended to construct an entirely new school at Baker Street, but this work is in abeyance for the time being.

The present school contains the Medical Officer's rooms, a cinema, a lecture hall, and various class rooms that contain diagrams and portions of apparatus including a complete motor coach. For demonstration purposes, banks of lamps are used instead of motors in order to illustrate the action of the control apparatus. In railway work it is an accepted principle that it is far more important to know how to stop a train than how to start one, and on this account the Underground staff are given a very thorough insight into the details of the Westinghouse pneumatic brake, with which all the Underground trains are equipped.

Other instructional equipment, such as that for dealing with emergency devices cutting off the current in case of short circuits, air door engines and snow fighting equipment, is also provided. More than

50 per cent. of the stations on the London Transport system are entirely underground at depths varying from 30 ft. to 160 ft. Originally communication between the top and bottom stations was maintained by lifts, and although many of these stations are now provided with escalators there are still lifts in service, and lift control equipment also is installed at the Lambeth school.

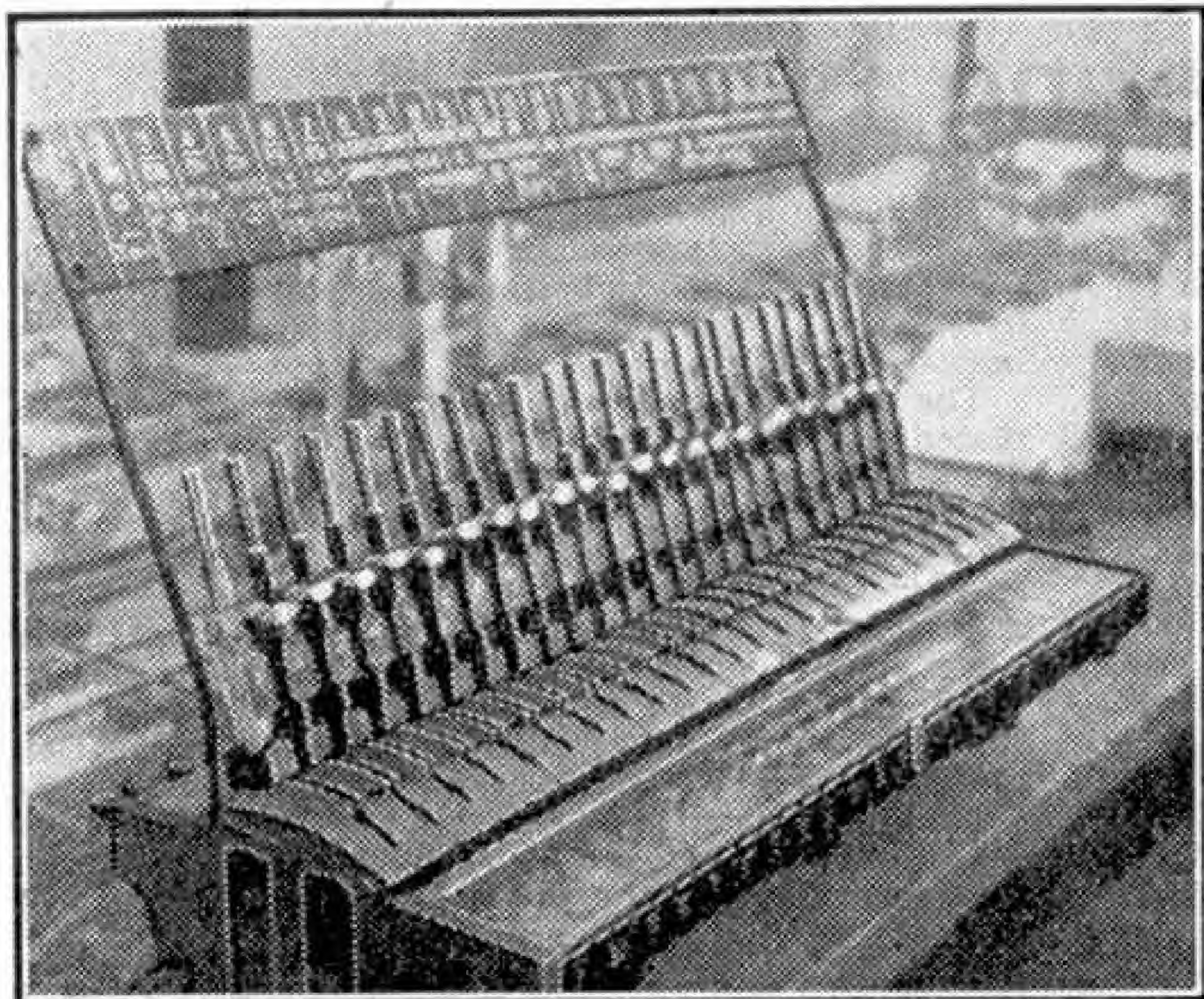
Instruction in signalling is given by the means of a complete electrically operated model railway, which is a replica of actual Underground track with Underground rolling stock. The line is fully track-circuited throughout, and two-aspect colour light signals are in use. Some of these signals are automatic, while others working in connection with points are operated from the signal cabin. The signal cabin consists of a full size power interlocking frame as actually used



Towersnagar station on a model railway constructed in India for staff instruction. Signals, lever frame and Tyer's block instrument can be seen.

on the system, and the position of the trains is indicated by an illuminated track diagram at the back of the frame. The railway runs along one side of a long room filled with desks and forms. Lectures are given on the operation of the power frame, the various rules to be observed by motormen and signalmen with regard to defective signals, and so on.

The school for signal staff at South Kensington is somewhat similar, except that it exists purely for technical reasons. It is situated in a disused station tunnel many feet below the ground. Full size Underground track is installed, with a pair of points operated by the Board's standard electro-pneumatic point layout. Track circuits and signals also are connected to this piece of track. There is a full size power frame operating the points and signals, an illuminated track diagram, and train description apparatus. A miniature track fitted on a long bench provides the various types of track circuits and relays in use, with facilities for testing and making electrical measurements. A proper syllabus of training is used, there being courses for elementary, intermediate and advanced apprentices, and also for signal linemen. These include both theory and practice, and examinations are held. This school was in operation during peace time.



A miniature lever frame with mechanical interlocking.

Portable models are of great use also when required in offices or for taking about the line. The "track" in this case consists of a painted replica on black oilcloth. Four or five station yards of typical design are provided, the distance between successive stations being about 5 ft. There are miniature signals with arms capable of being operated, including "distant," "homes" and "starters," with shunt signals, point indicators, etc. These can be stood alongside the painted track in accordance with the standards of signalling and interlocking practice. The extent of the block section, station sections and station limits is clearly indicated by arrows painted in different colours. The "rolling stock" consists of miniature locomotives, trucks, brake vans, carriages, etc., which can be pushed about as required. This type of model can be kept in a small fitted box together with a diagram illustrating the various types of signalling installations in use, and various situations, emergencies, and explanations of the working rules. General and Subsidiary Rules can easily be demonstrated with it.

Another model of similar design can also be used in the Engineering Department for working out positions of temporary engineering signals. These signals are used for temporary speed restrictions and for dead stops such as would be imposed for repairs to bridges, culverts, and similar engineering works. The signals are positioned according to standard orders, and where these encroach on interlocked territory certain working signals have to be put out of use. This type of model can be used to illustrate such situations, and is of advantage also in Permanent Way Inspector's examinations.

A model railway recently constructed "somewhere in India" is in extensive use for training members of the Railway Operating Companies and Royal Engineers. The line consists of an original section and an extension. The original portion was constructed in the early days of the war and was the work of an enthusiast. The track is "0" gauge, single line, and most of the material used is wood. There are two very

fine stations, "Rowsellabad" and "Melvilgunj." These stations are complete with buildings, boundary fences, loading gauges, scotch blocks, etc. At "Rowsellabad" the points at each end of the yard are operated by "ground frames" and the signals from a central "lever frame." Neither of these frames is of the accepted design nor is the interlocking that is employed, but the chief thing to be said about them is that they work.

The extension of this line was begun about February 1942 at the request of the Traffic Dept. The extension is about 25 ft. long and has two stations, "Smithgunj" and "Towersnagar." The latter station is situated where the single line becomes double. There is a main line platform, and an island platform connected by a footbridge, with up and down tracks and a platform loop, goods sidings and platform.

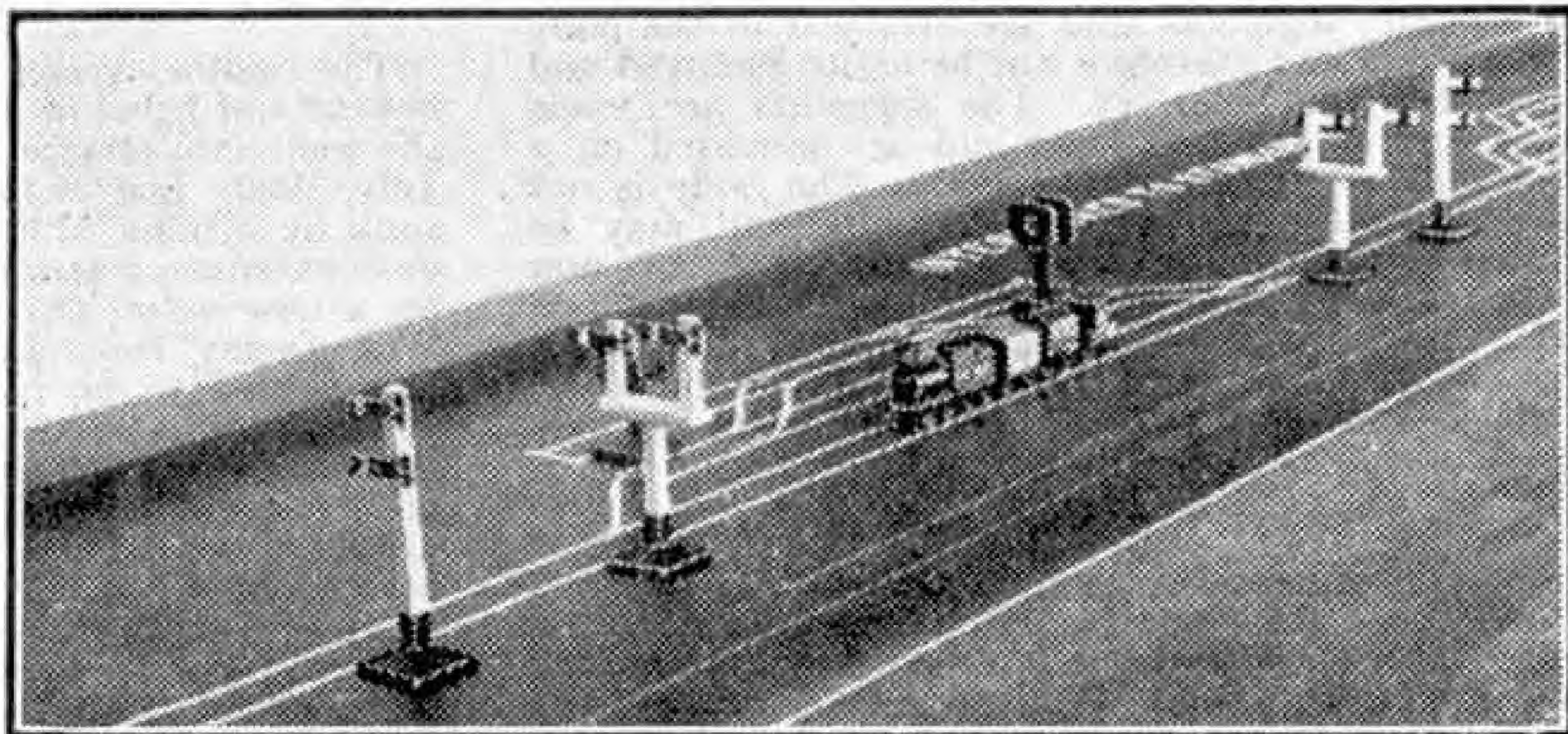
The connection from single to double line is operated by "A" Cabin, which consists of a 16-lever type frame in miniature. All the points and signals are connected to this frame and the levers are interlocked in the proper manner. The shunt signals take the form of the standard target; no arms are in use.

"B" Cabin consists of a 24-lever frame of the same type. Control levers are provided in each frame, so that the "home" signals cannot be lowered to permit the entry of a train into the station until the "slot" has been obtained from the furthest cabin. This applies also to the "distant" signals. These two cabins operate four crossovers, one set of points, two derailing switches or "trap points," 15 running signals and 11 shunt signals of target pattern.

"Smithgunj" is a double line station with a small goods siding. The layout is controlled by a 16-lever frame and this cabin operates 10 signals and four crossover points. Signalling between "Towersnagar" "B" Cabin and "Smithgunj" consists of Tyer's standard three-position block instruments, fixed on instrument shelves over the miniature lever frames. Each cabin has a standard signal diagram hung up over the lever frame, and these are exactly in accordance with those used in actual cabins.

Most of the work on this model had of necessity to be done by hand, as it involved the filing and fitting of a large number of very small castings. The rodding connections to the points are true to scale, compensators, adjusting and other cranks being in use. It was not possible to install locking bars and facing point locks owing to the small scale.

The lever frames took a considerable time to manufacture, as they are complete working models of the type in use on this particular railway. The catch handle correctly lifts the lever shoe out of the quadrant, and each lever has its number plate and is painted the correct colour.



Miniature signals and train, with track painted on cloth.

Engineering Notes

Fire Detection in Motor Buses

A novel fire detection and extinguishing system for use in motor buses has been introduced in America. It comprises a number of specially designed flame detectors, which are fixed at possible danger points about the engine. If from any cause a flame occurs these instruments instantly light up a red warning lamp fixed on the driver's dashboard. The driver then pulls a handle, and a cloud of compressed carbon dioxide gas is released under the bonnet, which effectively smothers the flame. The gas is odourless and non-poisonous and does not harm the engine.

Sawing Hard Steel

Most readers have seen a high speed circular saw at work in a joiner's shop and been thrilled at the screech of the rapidly revolving blade as it tears its way through the timber. It is not so generally known that sawing is applied also to many other materials, and that mechanical saws play an important part in the engineering industry, where they are used for sawing metals, including hard steels. The sawing machines used in engineering range from the simple hack saw and its mechanically operated counterpart, to band saws of a somewhat similar type to those used for cutting curved and irregular patterns in wood, and powerful machines of the type shown on this page, which employs a circular blade. The machine illustrated is made by Clifton and Baird Ltd., Johnstone, Scotland, and is designed for sawing metal bars, ingots and rails, etc., and is available in four sizes, the largest of which has a saw 28 in. in diameter. This is mounted on a hard steel spindle revolving in gun metal bearings in a sliding saddle, and is driven by double helical gearing from a 10 h.p. electric motor. The front part of the machine bed forms the work-table, and in the rear portion is placed a gear-box that provides five different rates of feed, together with four different cutting speeds for each feeding rate. This comprehensive arrangement allows mild steel and any of the steel alloys in general use to be easily sawn. After the cut has been completed quick action power motion withdraws the blade from the cut.

The metal to be sawn is held in a special vertical and horizontal vice, and all the control gear is grouped together in a convenient position at the front of the machine.

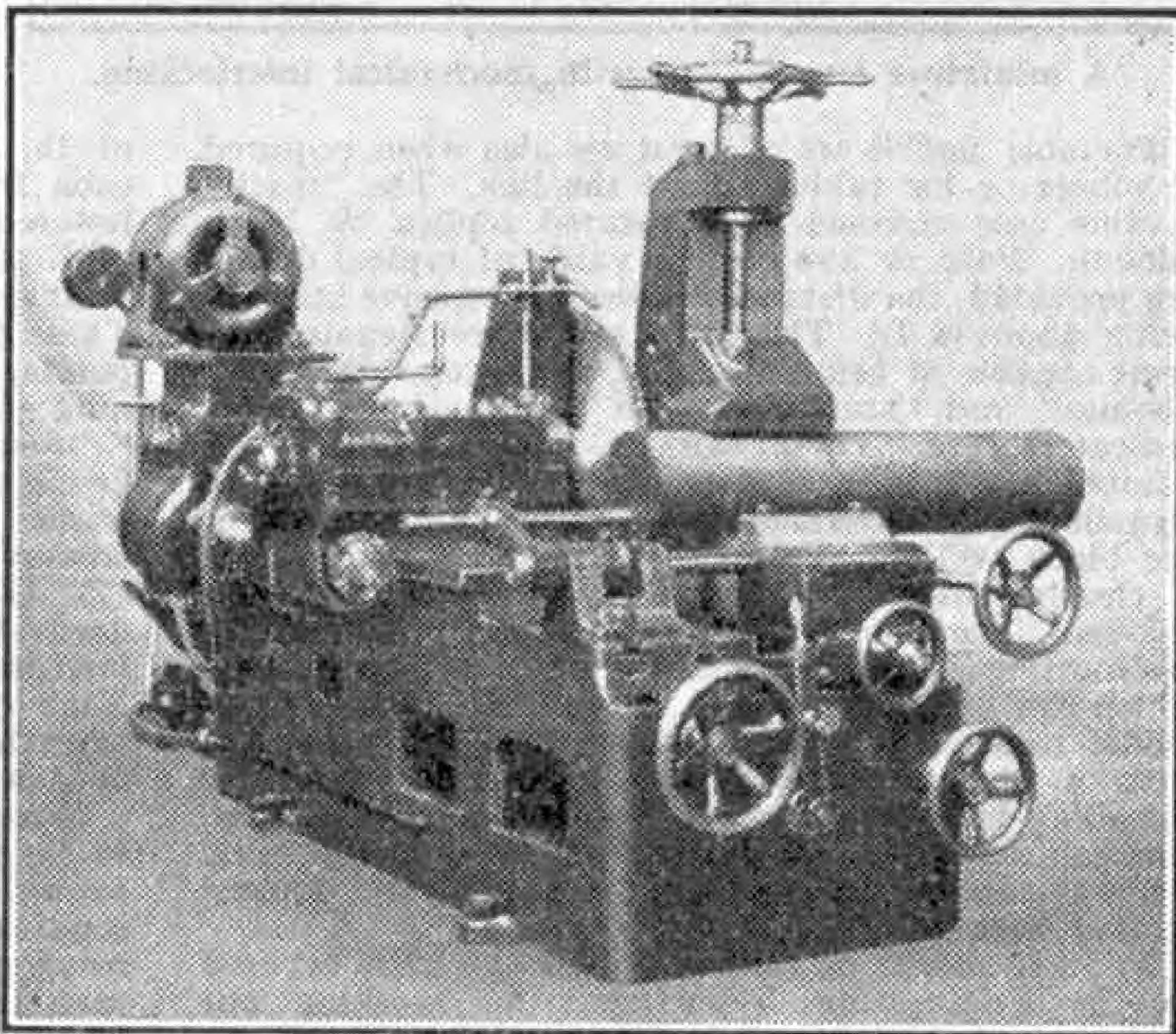
A particularly interesting feature is the saw itself, which is fitted with false teeth. Actually the teeth are separate segments that are attached to the body of the blade and therefore can be easily removed and replaced when necessary. The segments are made from super high-speed steel and are mounted on a hardened and tempered saw body. The body is not worn down by sharpening the teeth, and may be refitted several times with complete sets of new segments. The teeth work in pairs having square and "V" shaped or pointed cutting edges alternately. The pointed teeth take the lead and remove the centre of the cut, while the following square tooth removes the sides and corners.

"Radar" Increases Safety at Sea

An interesting post-war application of "Radar" is to be seen in the "electronic navigator" for use on ships. This is a device that is capable of detecting in fog, darkness and storm, the position of any above-water obstacles such as rocks, icebergs, wrecks, or other ships, at distances up to 30 miles, according

to their size and shape. The distances and positions of such objects are shown on a viewing screen, in correct proportions, and their size can be measured by reference to a number of concentric rings superimposed on the screen.

The apparatus uses a rotatable aerial, which is placed on the top deck of the ship. It works rather like a lighthouse or searchlight, only instead of sending out a beam of light it transmits ultra short radio waves in rapid succession. When the light strikes an object, no matter of what material it is, the beam is broken up and scattered. Some of the scattered waves are reflected back rather like sound echoes to the aerial on the ship, which picks them up and transmits them to an amplifier. After amplification the echoes or reflected waves appear as bright spots of light on the face of a cathode ray tube something like those used in television receivers. The image thus formed gives the operator a radar picture of



This machine is designed to saw steel and other metals at high speed in the cold state. It is a product of Clifton and Baird Ltd., Johnstone, Scotland, to whom we are indebted for the photograph.

the obstacle, and the concentric rings engraved on the tubes indicate its distance from the ship and the direction in which it lies.

A Well-known L.M.S. Steamer to be Replaced

The motor vessel "*Princess Victoria*" was the newest and finest of the L.M.S. fleet of 66 ships when she went into service on the Larne-Stranraer route in July, 1939. Less than a year later, however, she was sunk by a mine while she was acting as a minelayer on Government service. Now she is to be replaced by a new vessel that the L.M.S. have ordered from Wm. Denny Bros. Ltd., Dumbarton. The new ship is expected to be ready for service by the end of 1946, and will be 305 ft. 6 in. long with accommodation for about 1,500 passengers. Space will be available on the main deck for about 40 motor vehicles, and hinged doors at the stern will allow vehicles to be driven on or off the vessel at all states of the tide, over the shore ramps provided at Stranraer and Larne. The propelling machinery will consist of two sets of Sulzer seven-cylinder two-stroke cycle diesel engines, which will develop 5,100 B.H.P. at about 265 r.p.m.

Photography

Making Prints on Gaslight Paper

By John J. Curtis

THIS is the time of year at which we are all supposed to make good resolutions. I suggest that all photographic readers who do not already make their own gaslight prints should resolve to do so in future. No dark room is required, and the only necessary equipment consists of two dishes, one for developing and the other for fixing, a bowl of clean water, a printing frame, a packet of gaslight paper and the necessary chemicals for developing and fixing. As regards the chemicals I advise the purchase of a packet of Johnsons Metol-Quinol Developer or a bottle of Johnsons Universal Developer and a tin of Acid Fixing. Mix the developing and fixing solutions in accordance with the instructions provided.



"After the Day's Work." Photograph by R. W. Hennessey, Rustington.

Before mixing the solutions it is a good plan to sort out the negatives from which prints are to be made according to their density, that is thin, normal and thick. If, as is very advisable, the same strength of light is used each time, with the printing frame at the same distance from the light, the only variation in length of exposure will result from the different densities of the negatives.

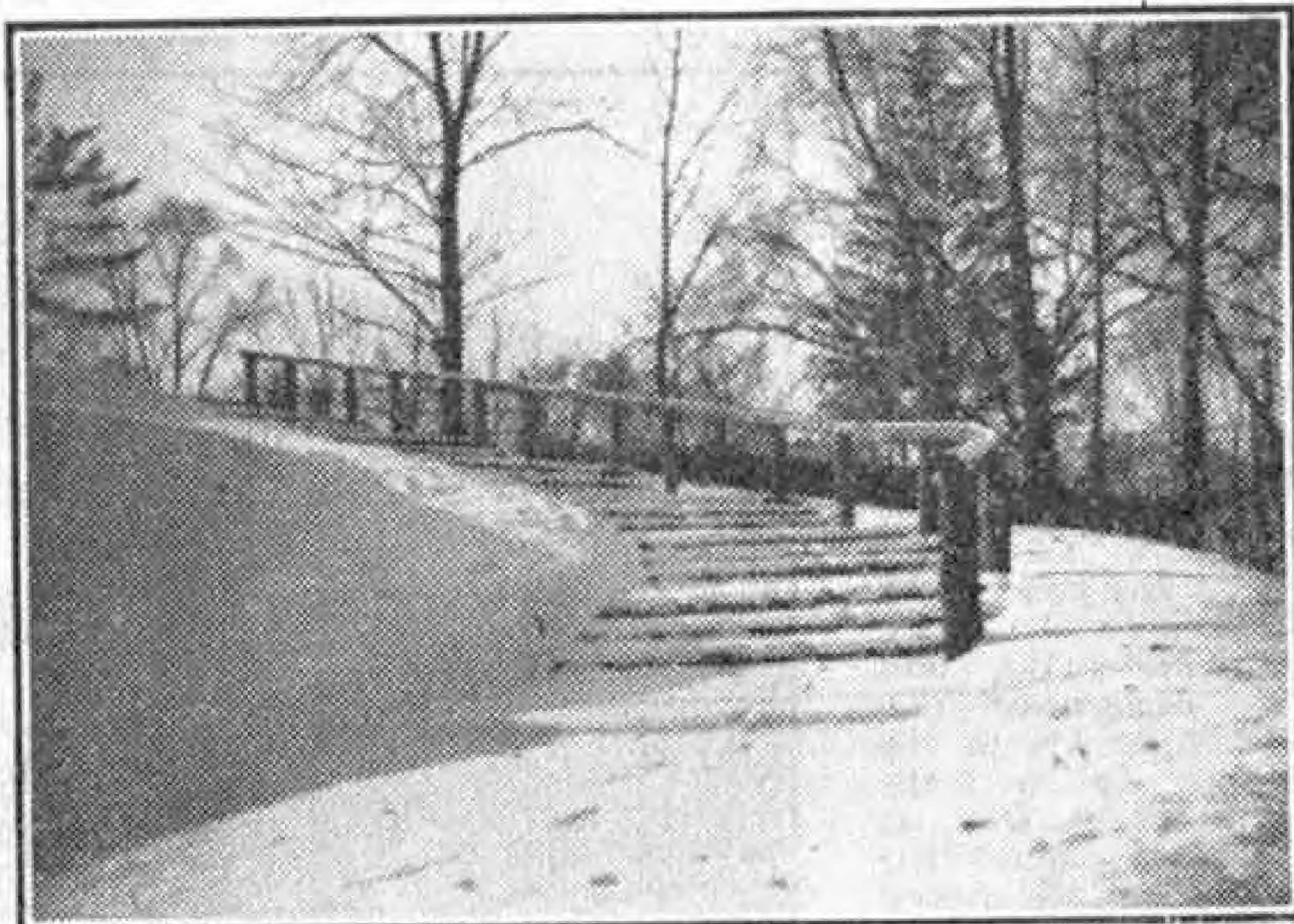
Any ordinary 40-watt lamp will do for exposing the paper, but if at all possible the lamp should be arranged at table level. Then the printing frame should be stood up facing it at a distance of one foot. If you are taking up gaslight printing for the first time, a test exposure should be made with a medium negative. By means of a strip of cardboard give part of the negative an exposure of three seconds, another part six seconds, another nine, and a fourth part 12 seconds. When this trial print is developed it will be easy to see which exposure gives the best result, and so an average time is obtained.

A light that is strong enough for printing purposes is of course strong enough to fog the paper. Fortunately gaslight paper is very long-suffering in this respect, and for taking paper from the packet and placing it in the printing frame, and for developing, the shadow of one's own body at a distance of a few feet from the light is safe.



"The Cold Spell." Photograph by R. B. Barrett-Lennard, Cressing, Nr. Braintree.

When you put a negative in the frame lay it on the glass dull side, that is emulsion side, uppermost, and the paper on this with its emulsion side down. With glossy paper it is easy to tell the emulsion side, but with all kinds of paper the sheet tends to curl inward towards this side. After exposure place the paper emulsion side up in the developing dish and pour the developer over it with a gentle continuous movement. Rock the dish and watch for the image, and when this has reached the correct strength remove the paper, swish it quickly through the bowl of water, and place it in the fixing solution, making sure that it goes right under the liquid. If the picture flashes up in the developer, exposure has been too long; if it is very slow in appearing, the exposure has been too short. Finally wash the prints in several changes of water.



"Winter in the Park." Photograph by P. Macdonald, Toronto, Canada.

A Working Scale Model Dock System

Wonderful Realism in Miniature

WE had the pleasure recently of seeing a beautiful example of model-making craftsmanship. This took the form of a complete miniature scale model dock system, comprising river approaches, locks, dry

built on the banks of a river that runs right across the layout, narrowing from its estuary at the left in Fig. 3 to a scale width of some 400 ft. at the extreme right. The system includes dry docks complete with workable gates, warehouses, oil storage tanks, cranes and dockside railways complete with several goods trains comprising over 300 railway wagons of all types. In the foreground outside the docks area are factories and warehouses, and in the rear lies a finely modelled landscape complete with a rocky headland. High up on the hillside is a fascinating ruined abbey, while rows of modern houses and a large half-timbered mansion add further realism. At the extreme right of the layout the main lines of the railway are carried over the river by a finely proportioned bridge and disappear into a tunnel cut in the hillside.

At the sea end of the layout a small seaside resort is laid out complete with promenade (M) and hotels (N), and a short distance off-shore is a lighthouse (O) giving warning of the dangerous jagged rocks and cliffs that form the coastline at that point.

Underneath the landscape section of the layout is fitted a large tank fitted with tap valves. In this is stored about three gallons of water for flooding the river and docks. One of the valves controls the escape of the water into the river estuary, which it enters through

the mouth of a small cave located in the rocky headland at the left. As its level rises the water washes over the rocks and sandbanks with a most fascinating and realistic effect, which is helped considerably by the very natural coloration of the river bed to represent swirls and currents in the water. When the system is flooded the model ships can float up the river to the dock entrance. Then, after passing through the gates of the half-tide dock (D), they can make their way either to the quays or to one of the dry docks (C) for repairs.

The dry docks are very complete in detail and

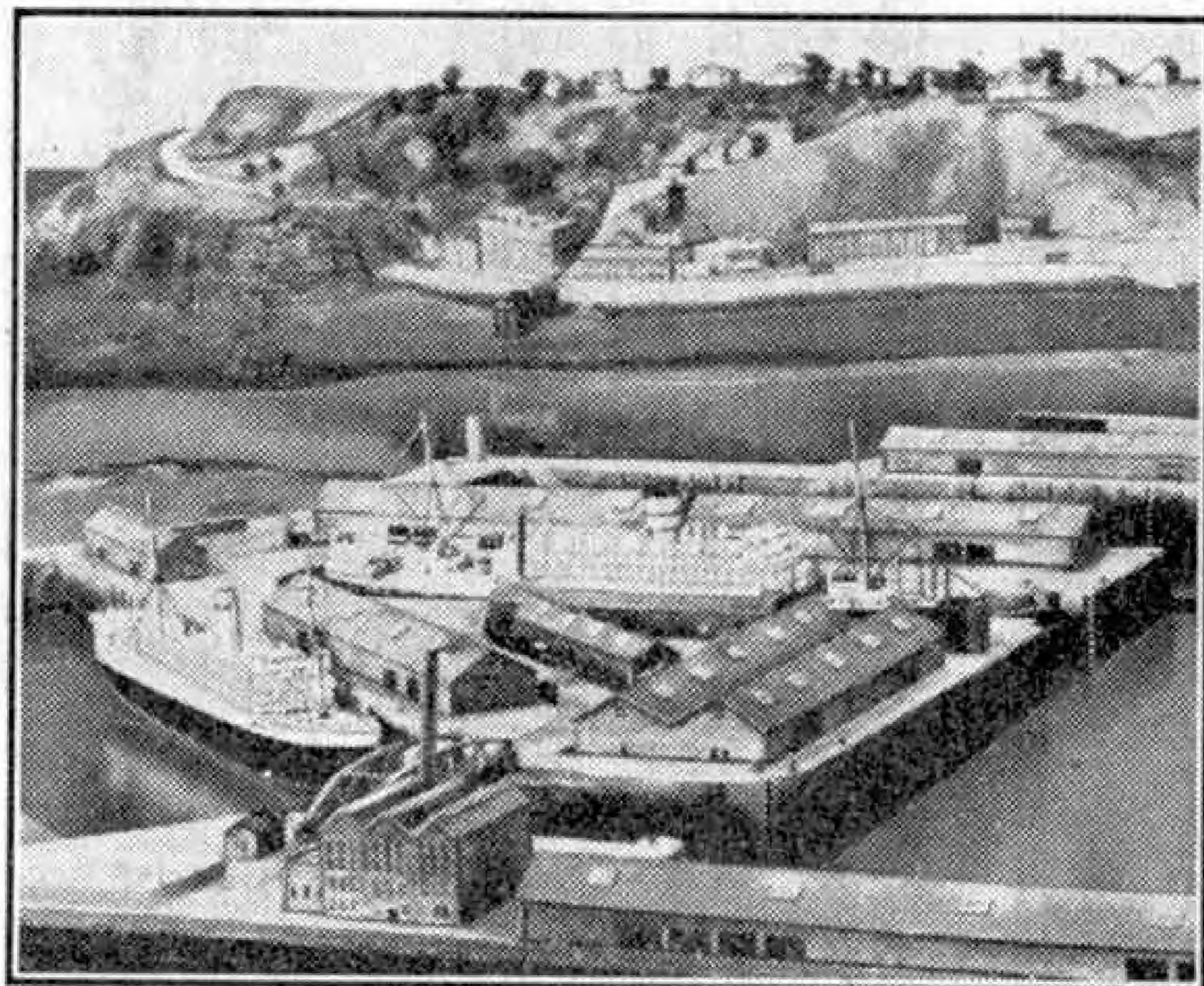


Fig. 1. A close-up of the dock area showing the "Carinthia" in dry dock and "Orduna" at a wharf.

and tidal docks, wharves, dockside railway and all the accompanying equipment, the whole being set against a most realistic and completely modelled landscape. The river and docks can be flooded with water. The model, which is shown complete in Fig. 3, is the work of Mr. J. Cowley, Liverpool, and it represents several years spare time work.

The overall size of the layout is 4 ft. by 3 ft., and its amazingly realistic effect is due to the very great care Mr. Cowley has taken to model every detail exactly to scale. This applies to even the smallest items, all of which are modelled to a scale of 100 ft. to 1 in.

In addition to the dock system Mr. Cowley has made a number of fully detailed vessels of all kinds, liners, cargo ships, oil tankers, dredgers and lightships. Only a few of these exquisite models are seen in the illustrations. These are the "Orduna," shown at V Fig. 3, "Carinthia" (S), "Empress of Britain" (U), "Olympic" (W), and the "Idomeneus" (Z). A dredger lies in the estuary. In Fig. 1 the "Orduna" is seen at a wharf and the "Carinthia" has moved to dry dock.

The dock estate is

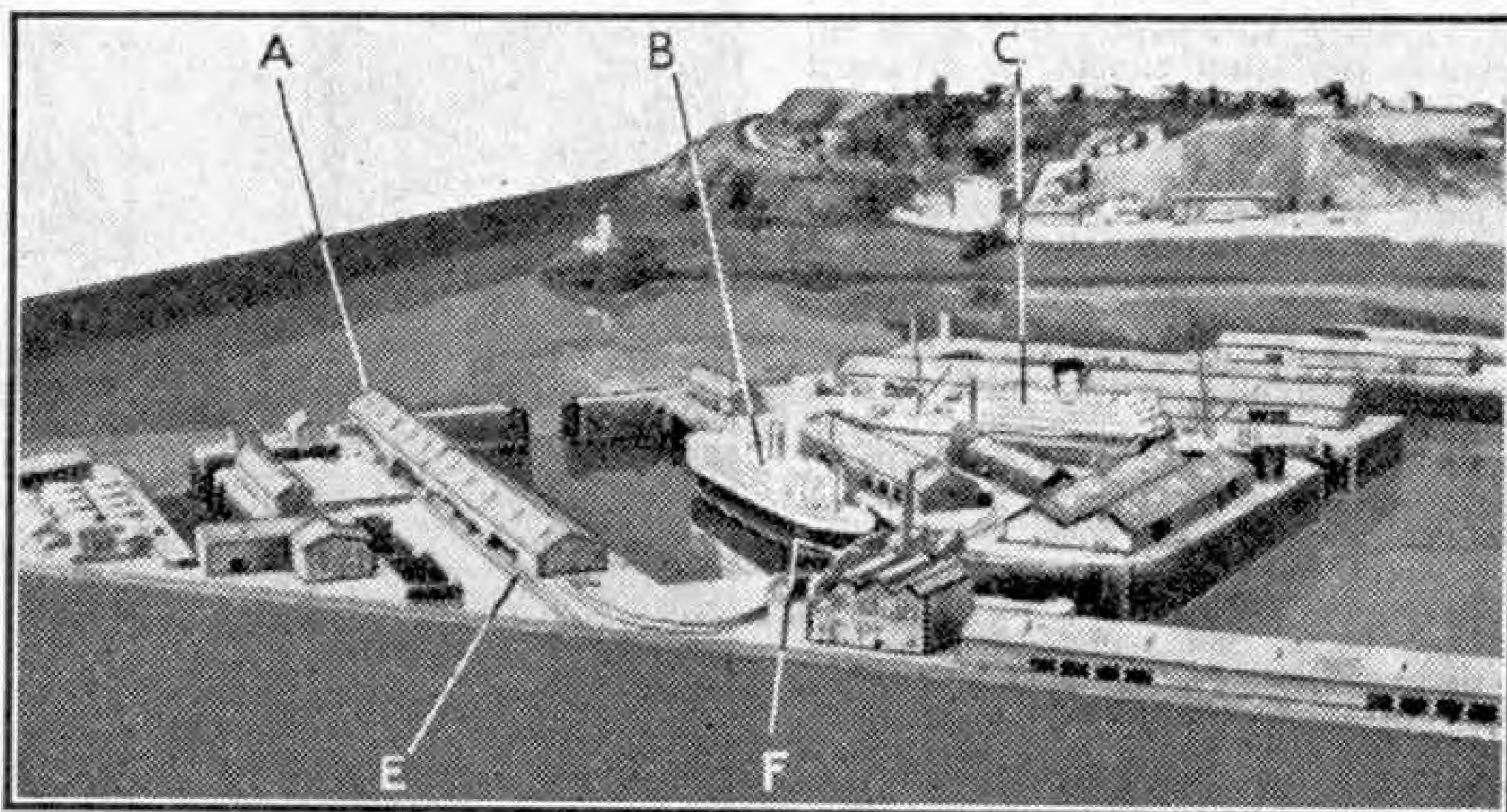


Fig. 2. A further section of the dock area.

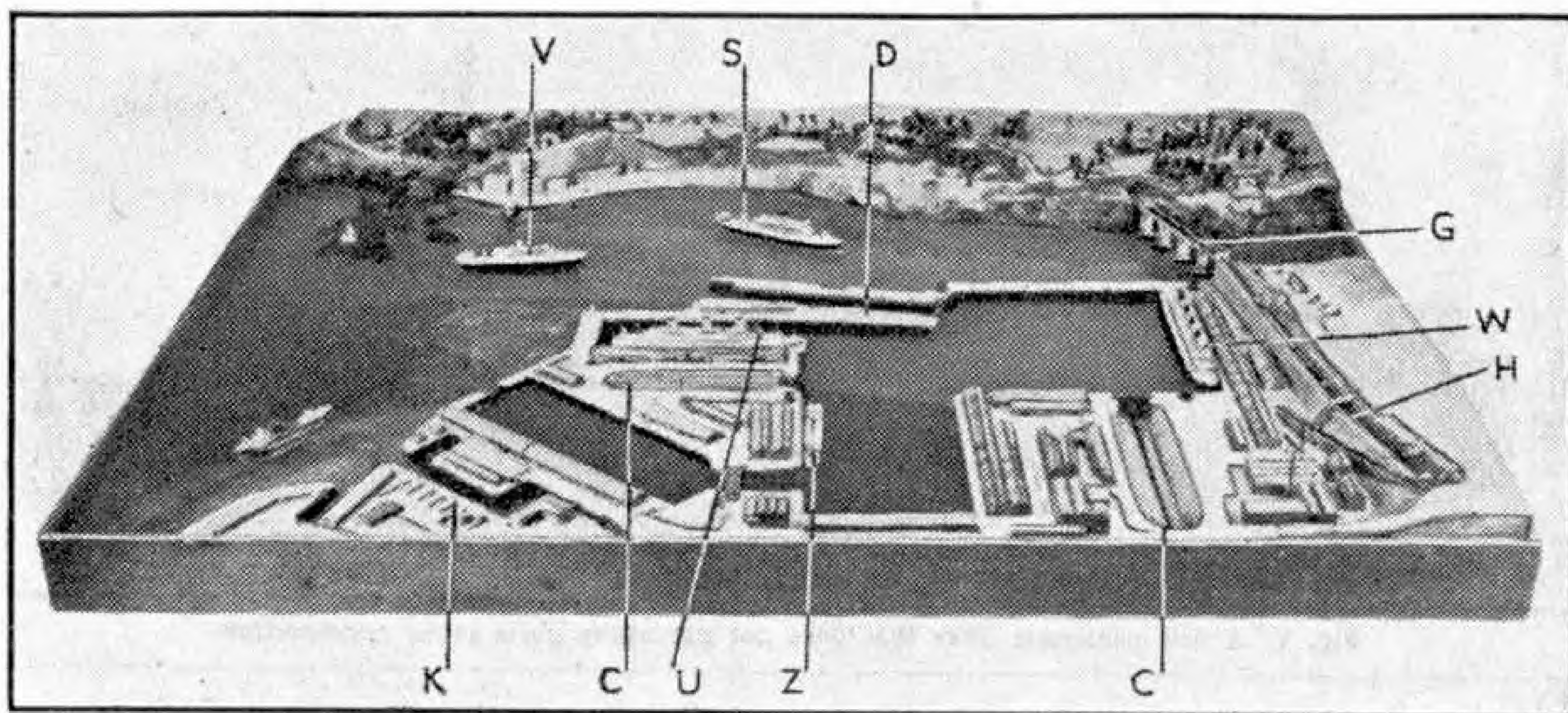


Fig. 3. The complete scale model dock system that is described in the accompanying article. It was designed and built by Mr. J. Cowley, Liverpool.

can be flooded and emptied by means of miniature valves. When a ship is in position resting high and dry on the keel blocks, it is astonishingly realistic. If the dry dock is flooded by opening the appropriate valve, the ship slowly rises as the level of the incoming water lifts it from the blocks, and when the gates are opened can pass out ready for sea once more.

The main constructional materials used in the model are wood, cardboard, wire, paper and paint of many colours. The base of the model is a stout sheet of plywood, which was sized and then painted with several coats of aluminium and paints of various colours to represent deep and shallow water. The dock walls are cut in wood, and their gates are very thin wood with pins for their hinges and swivel hooks. They close against a small sill, which assists in making them absolutely water-tight. The gates in the small dry dock are only $\frac{1}{4}$ in. in length.

A swing girder bridge (F), Fig. 2, has a base of plywood, and the girders are cut cleanly from thin postcard.

All the various parts of the model are suitably painted, and this is so skilfully done that it is difficult for the observer to identify the simple materials that form its basis.

One of the most interesting features of the countryside section along the rear of the layout is a fine

ruined abbey. There is also a splendid representation of a half-timbered mansion, and dozens of tiny modern villas of varying styles and sizes.

Another very fascinating feature is the tiny trains to be seen at various points along the dock walls. The height of the trains from the rail level is only about $\frac{1}{8}$ in., yet with the aid of a magnifying glass there is an amazing wealth of detail and lettering to be seen in both the locomotives and the trucks. One such train consists of a tiny tank engine hauling a number of petrol tank wagons. The railway wagons are roughly $\frac{1}{8}$ in. in length, and one can imagine the difficulty and labour involved in lettering both sides and making four wheels for each one of over 300 wagons and vans that are included in the layout. The wheels are made from a length of wood of the required diameter, which was cut with a razor blade into thin slices. Oil storage tanks can be seen at K in Fig. 3.

Some of the most realistic work of all has been done in the rocky formations (L) that form the coastline at this point. Actually the rocks and cliffs are made from irregular blocks of wood hacked and split off with saw cuts to form jagged edges. Paint in browns, purple, greens and yellows gives them a most realistic effect, which certainly justifies the provision off-shore of a business-like little lighthouse.

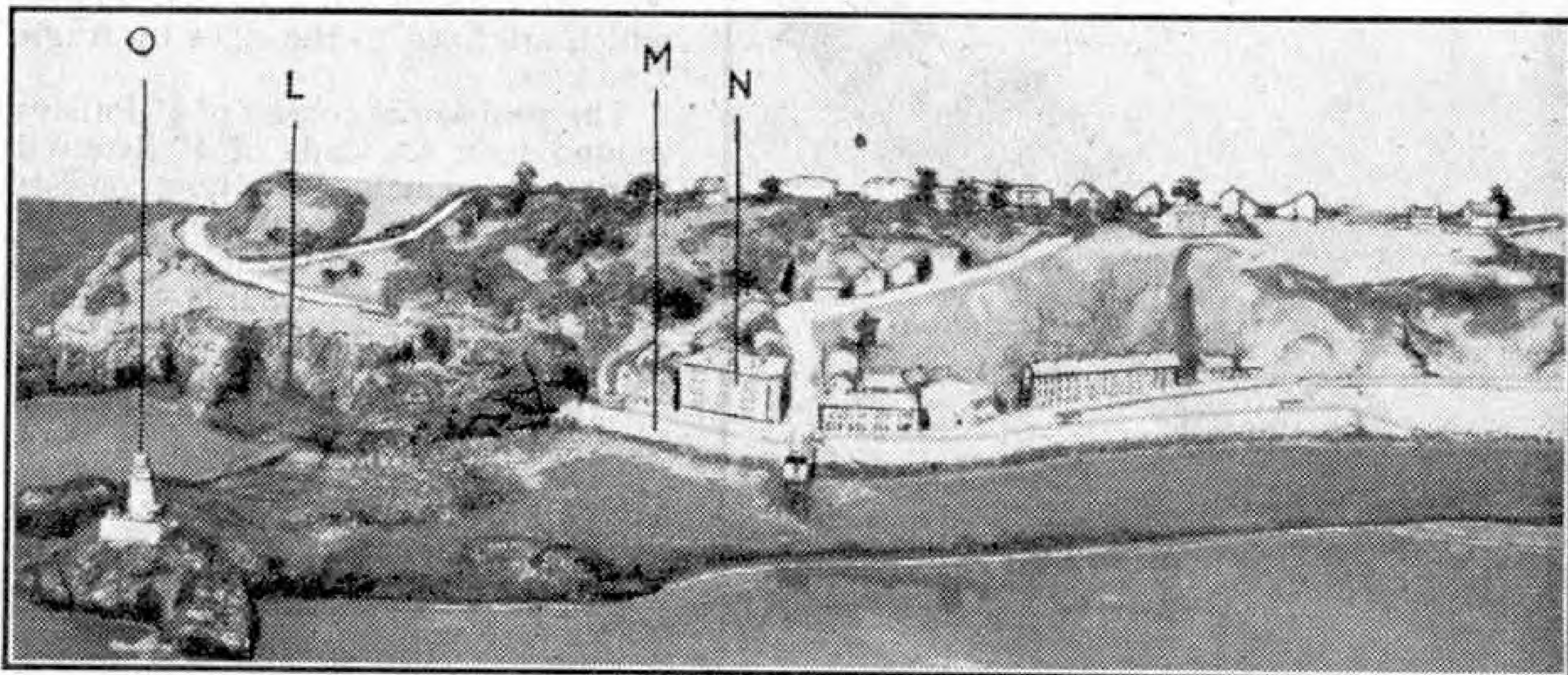


Fig. 4. Part of the landscape section that forms a background to the layout. The rocky headland at the left is particularly realistic.

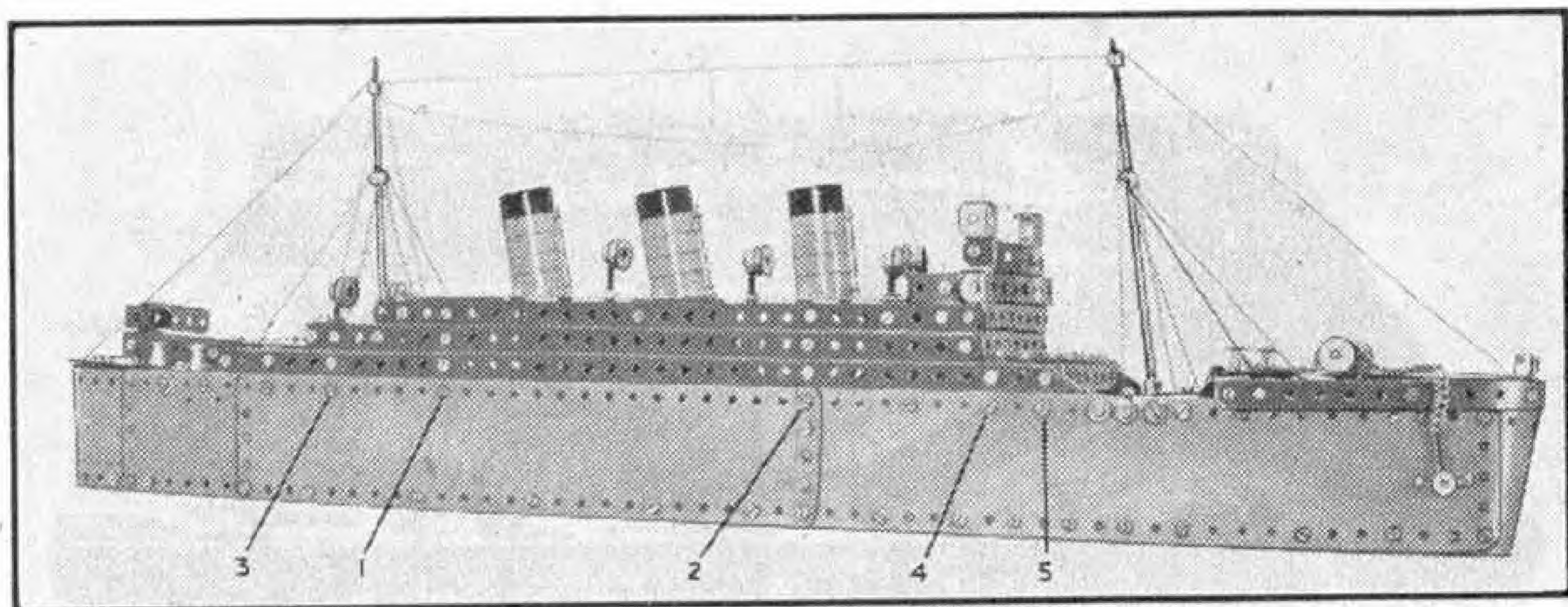


Fig. 1. A fine passenger liner that does not use many parts in its construction.

New Meccano Models

Modern Passenger Liner—Steam Engine

THE fine model passenger ship shown in Figs. 1 and 2 on this page has been specially designed to show the realistic appearance that can be obtained in work of this kind with comparatively few Meccano parts. Most model ships built in Meccano use a large number of parts in their construction, and therefore the model described here should appeal especially to ship lovers who have only a small stock of parts at their disposal.

The Flexible Plates that form the hull are bolted along their upper and lower edges to Strips, and the sides of the vessel

are kept apart by Double Angle Strips. The main deck is filled in at the bows and stern with Flexible and Semi-Circular Plates edged with $5\frac{1}{2}$ " Curved Strips as shown. The sides of the superstructure are Strips of various lengths, which are bolted to vertical $3\frac{1}{2}$ " Strips fixed to the hull by Bolts 1 and 2 and $1\frac{1}{2}$ " Strips held by Bolts 3, 4 and 5 on each side of the ship.

The front of the bridge is formed by $3\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips bolted between the forward ends of the Strips. Details of the bridge house can be seen in the illustrations.

The top deck consists of two $5\frac{1}{2}" \times 3\frac{1}{2}"$ Flat Plates overlapped, to which the three funnels are bolted. The after decks are also Flat Plates, which are fixed to the sides by Angle Brackets.

The ventilators consist of $\frac{1}{2}"$ Pulleys mounted on the ends of 1" Screwed Rods. The winch at the bow consists of two $\frac{1}{2}"$ fast Pulleys fixed on a 2" Rod, which is mounted in the turned up ends of a $1\frac{1}{2}"$ Double Bracket. Bollards for the hawsers are formed by Buffers.

Parts required to build model Passenger Liner: 10 of No. 1; 11 of No. 2; 7 of No. 3; 5 of No. 4; 3 of No. 9f; 7 of No. 10; 5 of No. 11; 16 of No. 12; 4 of No. 12a; 1 of No. 13e; 1 of No. 14; 3 of No. 17a; 8 of No. 23a; 241 of No. 37; 30 of No. 38; 1 of No. 40; 1 of No. 47; 5 of No. 48; 6 of No. 48a; 13 of No. 48b; 3 of No. 52a; 2 of No. 62a; 4 of No. 64; 4 of No. 82; 4 of No. 89; 1 of No. 90a; 1 of No. 103h; 2 of No. 111a; 1 of No. 111d; 6 of No. 120; 3 of No. 188; 4 of No. 190a; 4 of No. 191; 4 of No. 197.

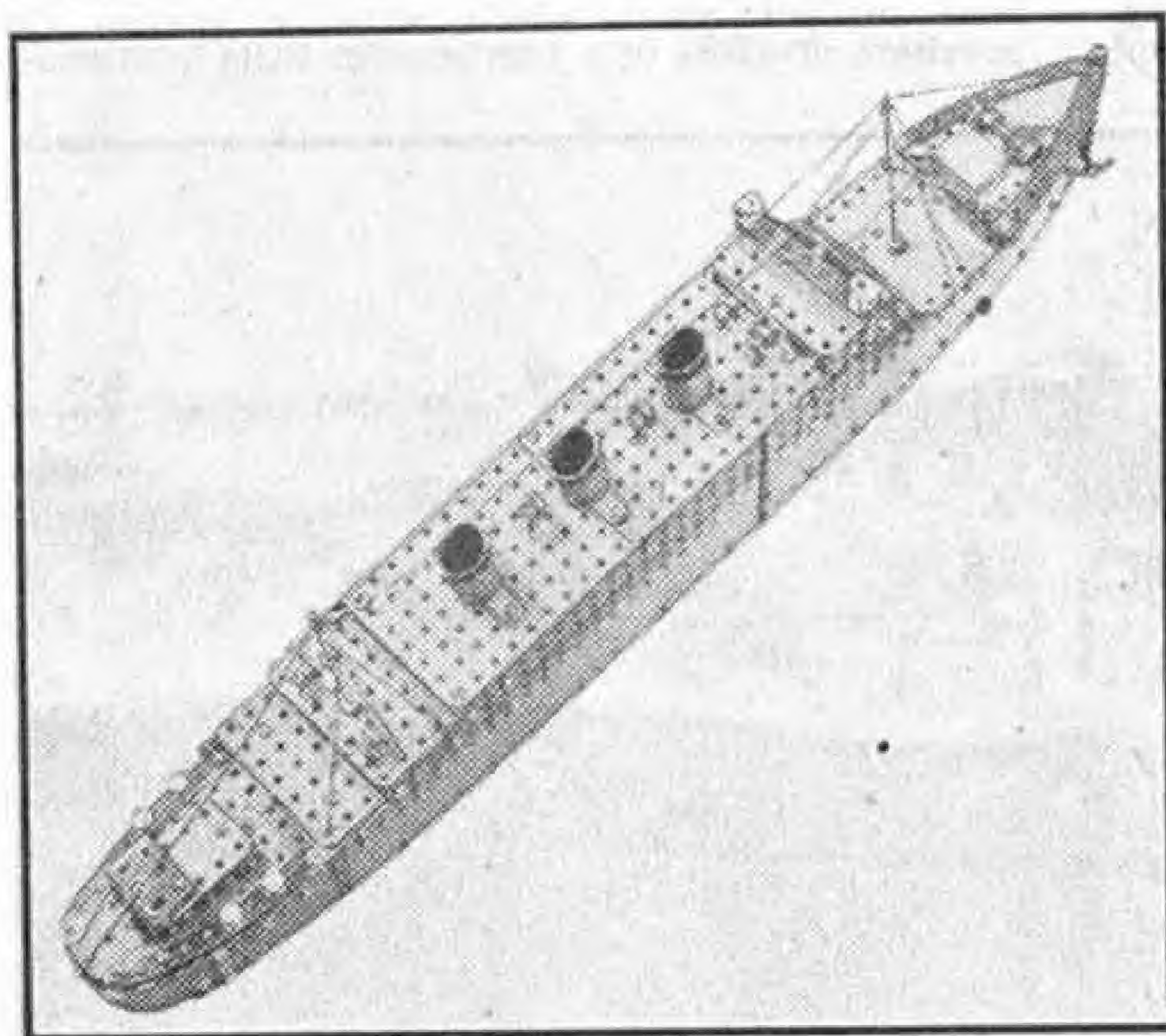


Fig. 2. An "aerial" view of the Meccano liner.

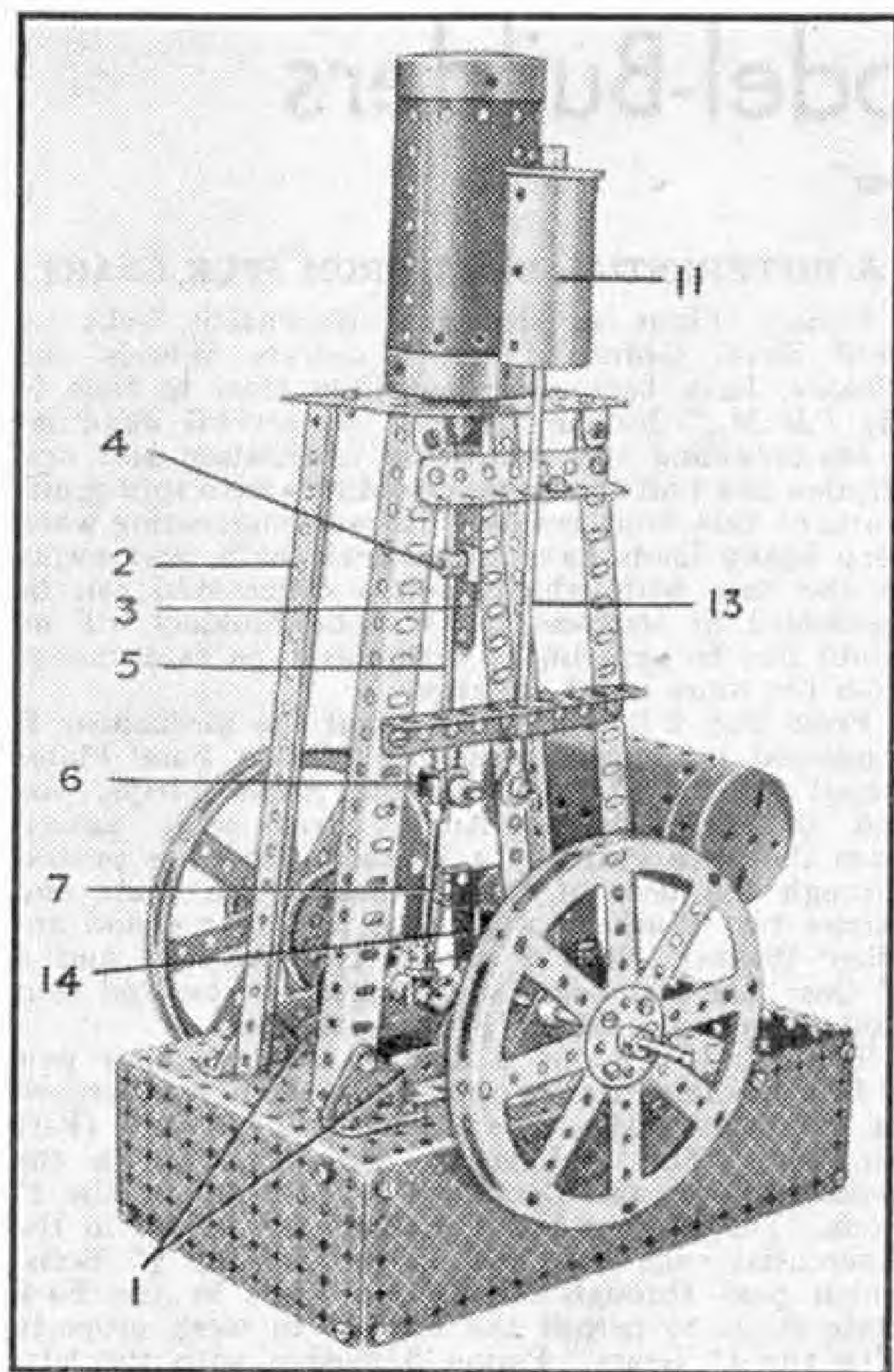


Fig. 3. A model vertical steam engine that can be set in motion by means of a Magic Motor.

In building the model vertical steam engine shown in Fig. 3 it is best to begin by placing two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates side by side $2\frac{1}{2}''$ apart and then joining them together by four $3\frac{1}{2}''$ Angle Girders. Two of the Angle Girders can be seen at 1 in Fig. 3. The two inner Girders are spaced $2''$ apart, and the others are bolted across the ends of the Plates. Each Girder carries a Flat Trunnion as shown and these form the bearings for the crankshaft. Flexible Plates are bolted to the flanges of the Plates, and at one end are bridged by a further $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. The four $9\frac{1}{2}''$ Angle Girders 2 that support the cylinder are bolted at their lower ends to Trunnions, and at their upper ends are attached in pairs to $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips that are bolted to and support a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate on which the cylinder is mounted.

The cylinder is a Boiler complete with Ends, the lower End being bolted to the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate. Beneath this Plate is fixed in a central position a Double Bent Strip that forms a guide for the piston rod. A $3\frac{1}{2}''$ Strip 3 bolted to the Double Bent Strip carries an Eye Piece 4, which

is free to slide up and down the Strip. The Eye Piece is fixed on the piston rod 5, which passes through its boss, and is fitted at its lower end with a large Fork Piece 6. The connecting Rod 7 carries at its upper end a Handrail Coupling 8, and this pivots on a $1''$ Rod 9 supported in the arms of the Fork Piece. The lower end of the connecting rod is pivotally connected to the crank pin by a small Fork Piece 10 (Fig. 4).

The valve chest 11 (Fig. 3) is a $2\frac{1}{2}''$ Cylinder bolted to the side of the Boiler.

The crankshaft consists of two Rods each carrying a Coupling at one end as shown in Fig. 4. The Couplings are joined by a $1\frac{1}{2}''$ Rod that forms the crank pin. On one end of the crankshaft is an Eccentric 2 that operates the valve rod 13, to which it is connected by a $2\frac{1}{2}''$ Strip and a Rod and Strip Connector.

The model is driven by a *Magic Motor* 14, which is bolted to one of the rear $9\frac{1}{2}''$ Angle Girders.

Parts required to build model Vertical Steam Engine: 1 of No. 5; 4 of No. 8a; 1 of No. 9a; 5 of No. 9b; 2 of No. 10; 2 of No. 13a; 2 of No. 15a; 1 of No. 18a; 1 of No. 18b; 1 of No. 20; 1 of No. 20a; 2 of No. 24; 76 of No. 37; 78 of No. 37a; 4 of No. 38; 2 of No. 48a; 1 of No. 50a; 3 of No. 52; 1 of No. 53a; 6 of No. 59; 2 of No. 63; 1 of No. 70; 1 of No. 116; 2 of No. 118; 1 of No. 123; 4 of No. 126; 4 of No. 126a; 2 of No. 162; 1 of No. 166; 2 of No. 196; 1 of No. 212; 1 of No. 216. 1 *Magic Motor*.

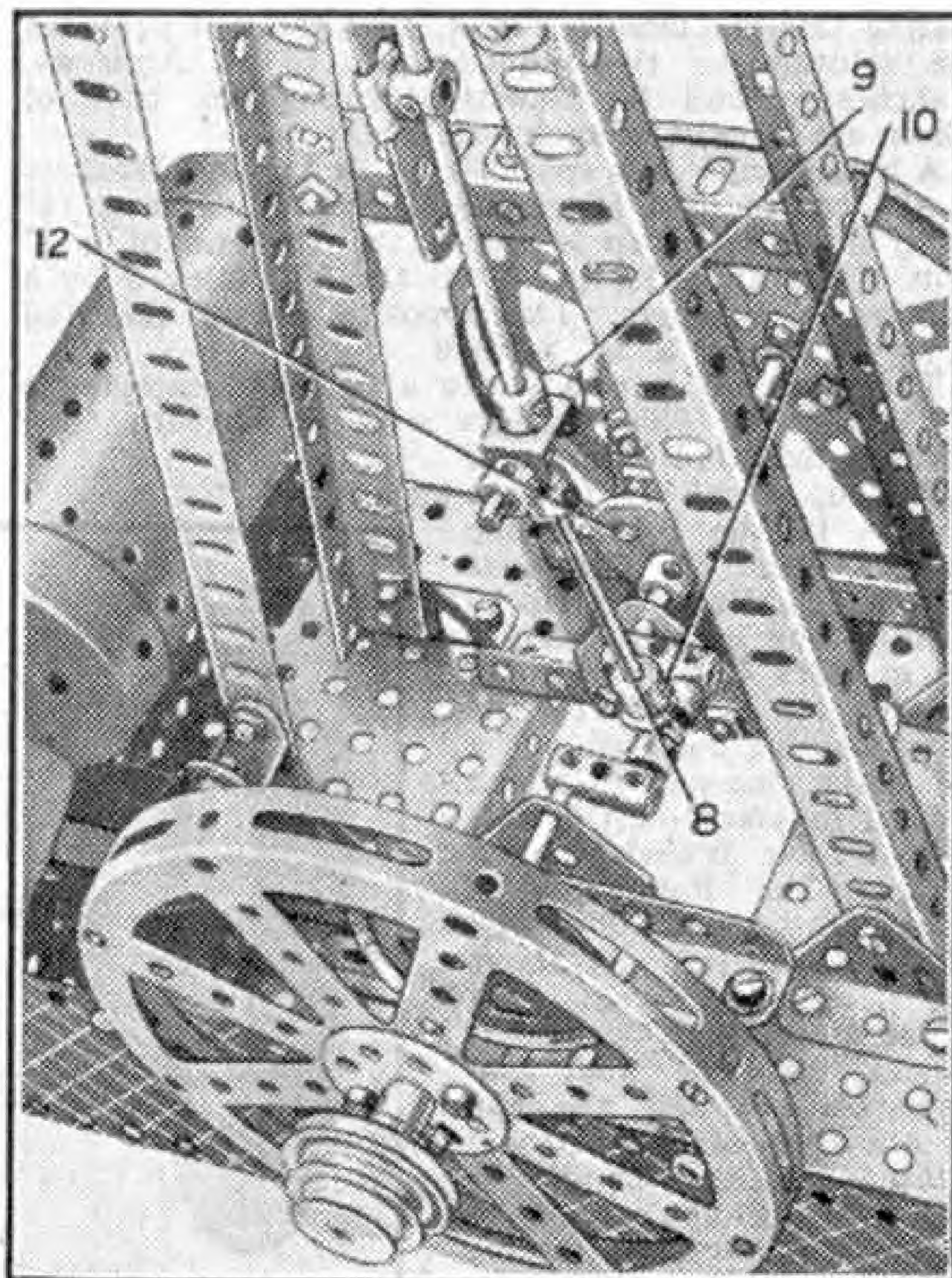


Fig. 4. A close-up view of the crankshaft of the vertical steam engine.

Among the Model-Builders

By "Spanner"

A USEFUL STRIP BENDING MACHINE

Some time ago one of my correspondents sent me details of a useful device that he had built for bending Strips and similar pieces of thin metal. I am illus-

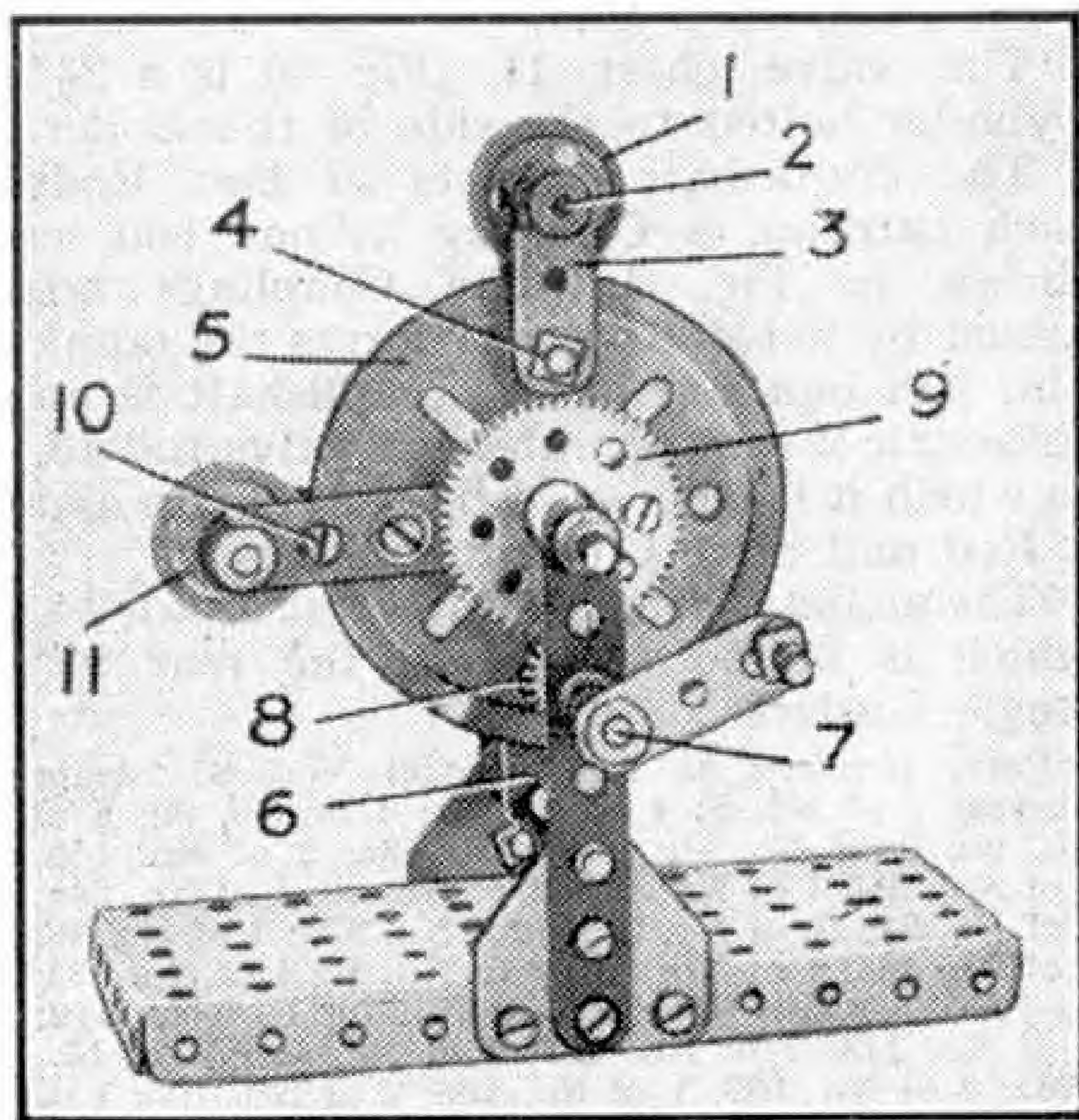


Fig. 1. A useful metal strip bending machine.

trating this machine in Fig. 1, as I think it provides the solution to the requirements of S. Andrews, Manchester, and M. Hewitt, Birmingham, both of whom are in need of such a device.

A loose Pulley 1 is spaced by a Collar and Washers in the centre of a short Rod 2 journaled in a $1\frac{1}{2}$ " Strip 3. The Strip is secured to the end of a $\frac{3}{4}$ " Bolt 4 and spaced away from the 3" Pulley 5 by a number of Washers. The opposite end of the Rod is supported by a $5\frac{1}{2}$ " Strip 6.

The handle 7 is secured to a $3\frac{1}{2}$ " Rod carrying a $\frac{1}{2}$ " Pinion 8. This engages with a 57-teeth Gear Wheel 9 mounted on another $3\frac{1}{2}$ " Rod, which is free to revolve in the boss of the Pulley Wheel 5. The Gear Wheel 9 carries a 3" Strip 10 forming one of the bearings for a short Rod carrying a second 1" Pulley 11, the other bearing consisting of a $2\frac{1}{2}$ " Strip, one end of which is held in place on the axle of the Gear Wheel 9 by a Collar. The Pulley 11 is also spaced by a Collar and Washers, and lies just above the 3" Pulley groove.

The material to be bent is passed between the two loose Pulleys and the rim of the Wheel 5, and on rotation of the handle 7, the arm 10 is caused to move downward, so forcing the material to the same curvature as the rim of the Pulley Wheel 5.

A DIFFERENTIAL BUILT FROM SPUR GEARS

Various kinds of Meccano differentials built up from Bevel Gears, or with Contrate Wheels and Pinions, have been described from time to time in the "M.M.," but in response to several enquiries I am including this month an illustration and description of a unit that is made entirely with spur gears. Units of this kind are used in real engineering when very heavy loads have to be dealt with, and owing to the ease with which such a differential can be assembled in Meccano many model-builders will no doubt like to experiment with this type as a change from the more usual varieties.

From Fig. 2 it will be seen that the mechanism is contained in a case consisting of two Face Plates joined by two $1\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strips, one end of each Double Angle Strip being spaced from the Face Plate by a Washer. Rod 1 is pushed through the boss of the left-hand Face Plate and carries two Washers, a 1" Gear, a Collar 4 and another Washer. Rod 2 carries two Washers and a 1" Gear, the last being so arranged on the Rod that Rod 1 protrudes about $\frac{1}{4}$ " into its boss.

The $\frac{1}{2}$ " x $\frac{1}{2}$ " Pinions 5 and 6, and a similar pair of Pinions diametrically opposite to them, are fastened on 1" Rods, using the short Grub Screws (Part No. 69c). The Pinions are then engaged in the manner shown and Couplings 3 are fitted on the 1" Rods. The Pinions and Couplings are placed in the differential cage and held in position by $\frac{1}{4}$ " Bolts, which pass through the slotted holes in the Face Plate so as to permit the Pinions to mesh properly with the 1" Gears. Pinion 5 meshes with the left-hand 1" Gear only and Pinion 6 meshes with the right-hand gear. It is important that diametrically opposite Pinions are arranged to mesh with the same gear.

READERS' IDEAS FOR NEW MECCANO PARTS

Among suggestions for new Meccano Parts received recently are two that crop up in varying forms from time to time and which I think will interest other model-builders. I shall be glad to have their comments on the proposed parts, which are illustrated in the accompanying sketches. One of the items is an adjustable bearing bracket, and is suggested by M. Webster, Birmingham. It is of similar form to a Crank, with a slightly longer arm that instead of

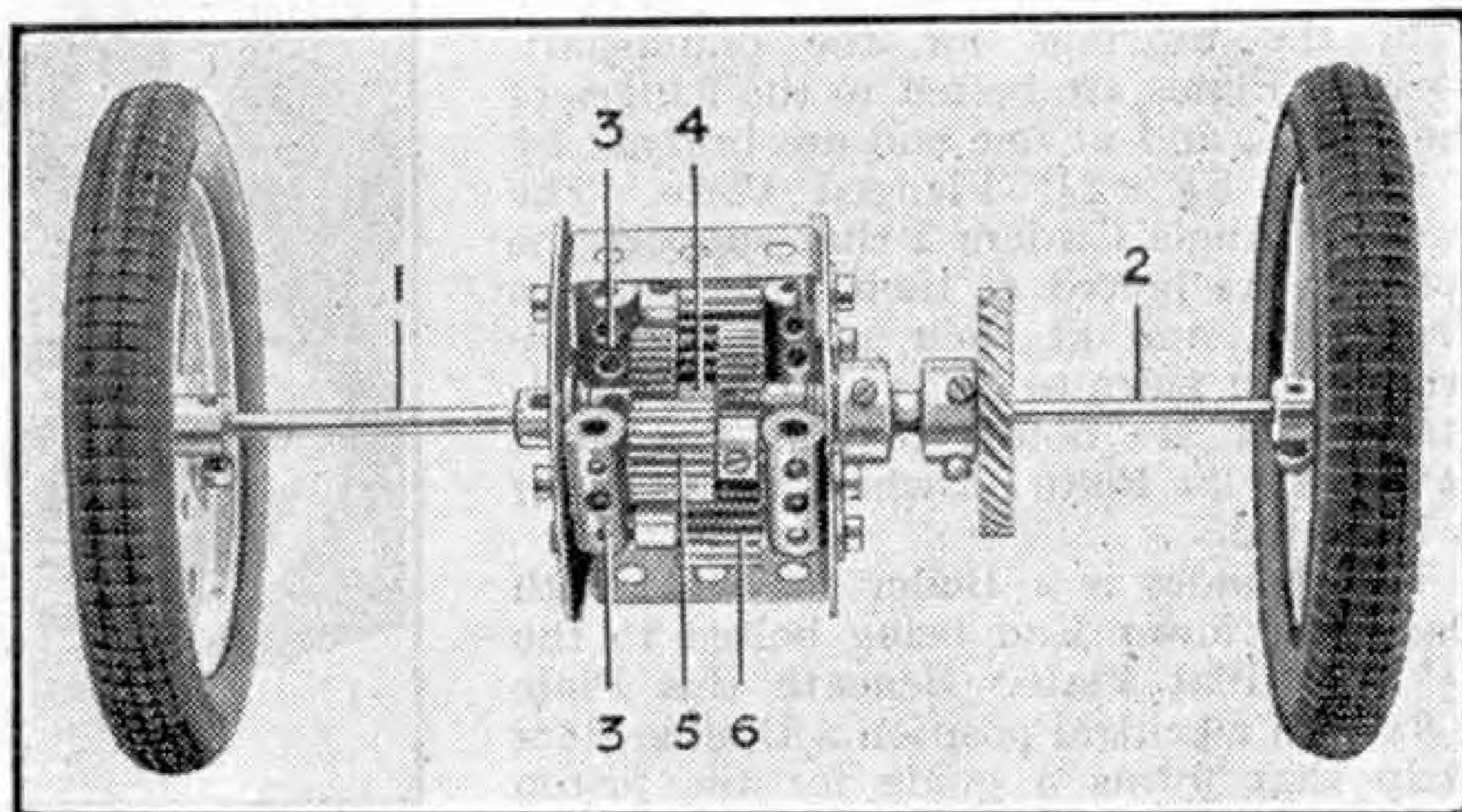


Fig. 2. Differential mechanism built up with spur gears.

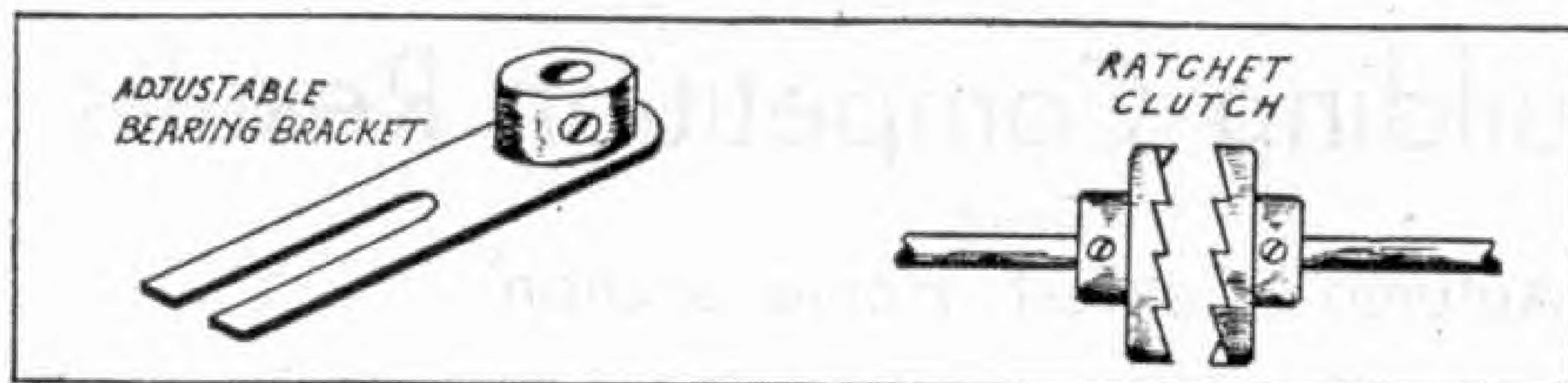


Fig. 3. Reader's suggestions for new Meccano parts.

having the standard holes is slotted as shown. The slot would allow the part to be fixed in place by bolting with a Washer under the head of the bolt, and when used as a bearing would allow fine adjustment to be made by sliding the part to and fro if necessary to bring two or more bearings into line. This of course is not necessary when following orthodox methods of Meccano construction, but there are occasions when designing experimental mechanisms when bearings having centre measurements different from those of the holes in standard parts are useful.

The ratchet clutch components shown in the other sketch were suggested by E. Miller, Liverpool, and would be useful in special mechanisms, but so far as I can see there is little need for it in the ordinary course of model-building. However, readers may have other ideas regarding uses for such a part and I shall certainly be interested in hearing from anyone who has a suggestion to put forward.

TOGGLE MECHANISM FOR PRESSES

A toggle mechanism is a simple link motion that transmits reciprocating movement at right angles to the operating force. The resultant movement is through a shorter distance than the original motion, but is considerably more powerful. Toggle movements are applied in particular to presses where

a very powerful action is required.

The general principle of operation of a toggle press can be seen in the mechanism shown in Fig. 4. An Eccentric operates the toggle links, one of which is pivoted on a $\frac{1}{4}$ " Bolt. The Bolt is secured to the frame, in this case a Flanged Plate, by two

nuts, and two more nuts are locked on the Bolt to retain the toggle link in place. The second link, also pivoted to the Eccentric, is attached to the sliding Eye Piece. As the Eccentric rotates it moves the links into a position where they both lie in a straight line, the movements of the Eye Piece decreasing in speed as the links approach the straight-line position. Thus, the power exerted by the Eye Piece increases towards the end of the power stroke.

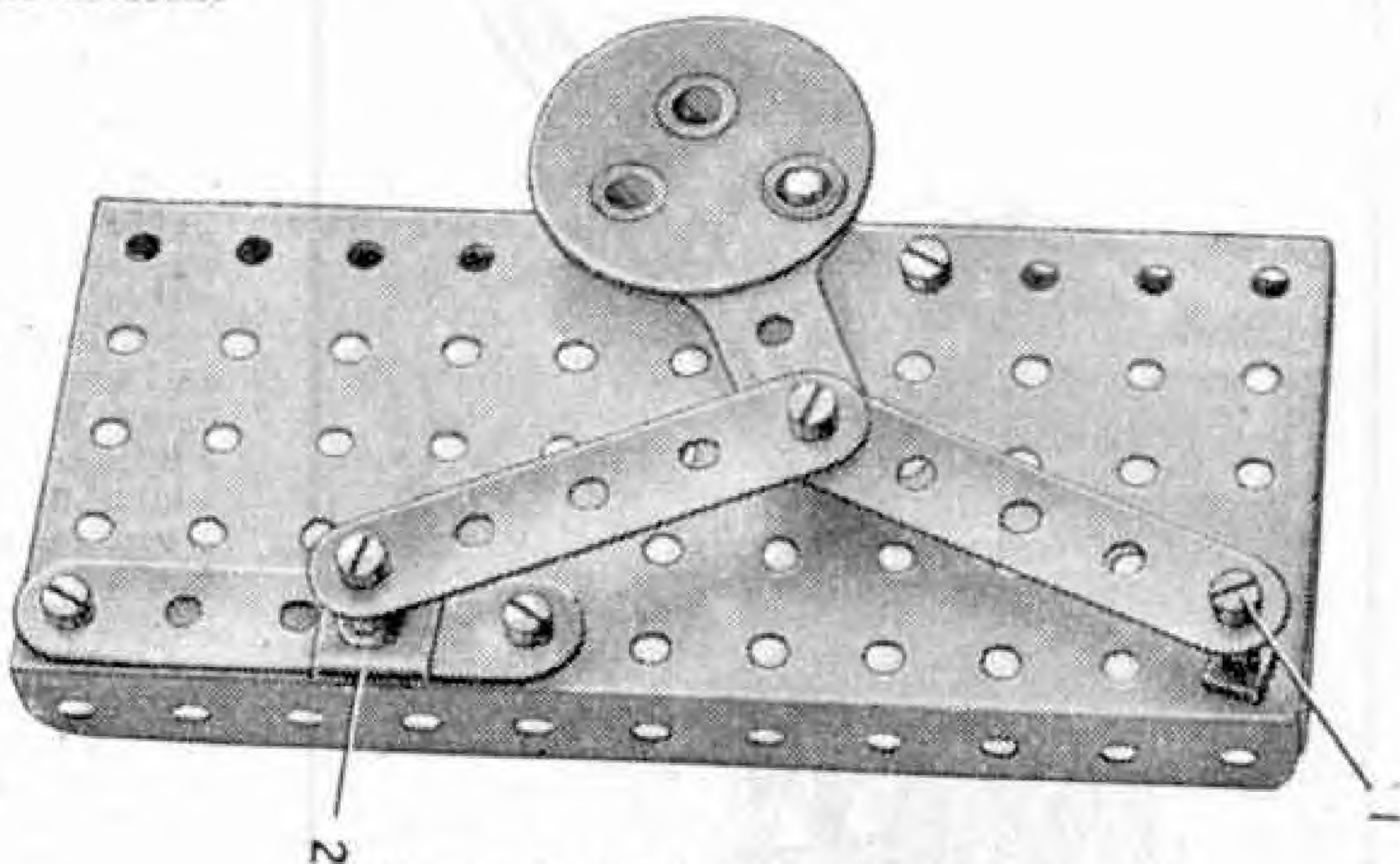


Fig. 4. A toggle link mechanism.

Enter Your Models For This Contest

The "Christmas Model-Building Competition," which was announced in the December, 1945, issue of the "M.M.," is still open for entries, and we are repeating the details here for the benefit of anyone who did not see the original announcement.

Models may be of any kind whatever, and of any size, but they must be built from Meccano parts. Cranes, motor vehicles, ships, machines of all types and aircraft, are some of the subjects suitable for models.

The conditions of this competition should give full scope to every model-builder, whatever type of model he is specially interested in, and to owners of all sizes of Outfits. It must be borne in mind that it is not necessary to submit large models; entries are judged on their realism and on the skill with which parts are used. Owners of small Outfits therefore should not hesitate to enter.

The actual model must not be sent. A photograph, or if this is not possible, a reasonably good sketch, together with brief details of the model's main features, are all that is required.

The competition will be divided into two Sections. A, for competitors of all ages living in the British Isles. B, for competitors of all ages living Overseas. Section A will close for entries on 31st January, but Section B will remain open until 31st March.

The following prizes will be awarded in each Section of the Contest. First, £2/2/-; Second, £1/1/-; Third, 10/6. There will be also a number of consolation awards and Certificates of Merit.

Competitors must write their name, address and age on the back of each photograph or drawing sent in, and envelopes must be addressed "Christmas Model-Building Contest," Meccano Ltd., Binns Road, Liverpool 13."

Model-Building Competition Results

By "Spanner"

"Autumn" Contest (Home Section)

DURING the last few months there has been a steady increase in the number of entries for the various model-building competitions announced in the "M.M.," together with a noticeable improvement in the quality and variety of the models submitted.

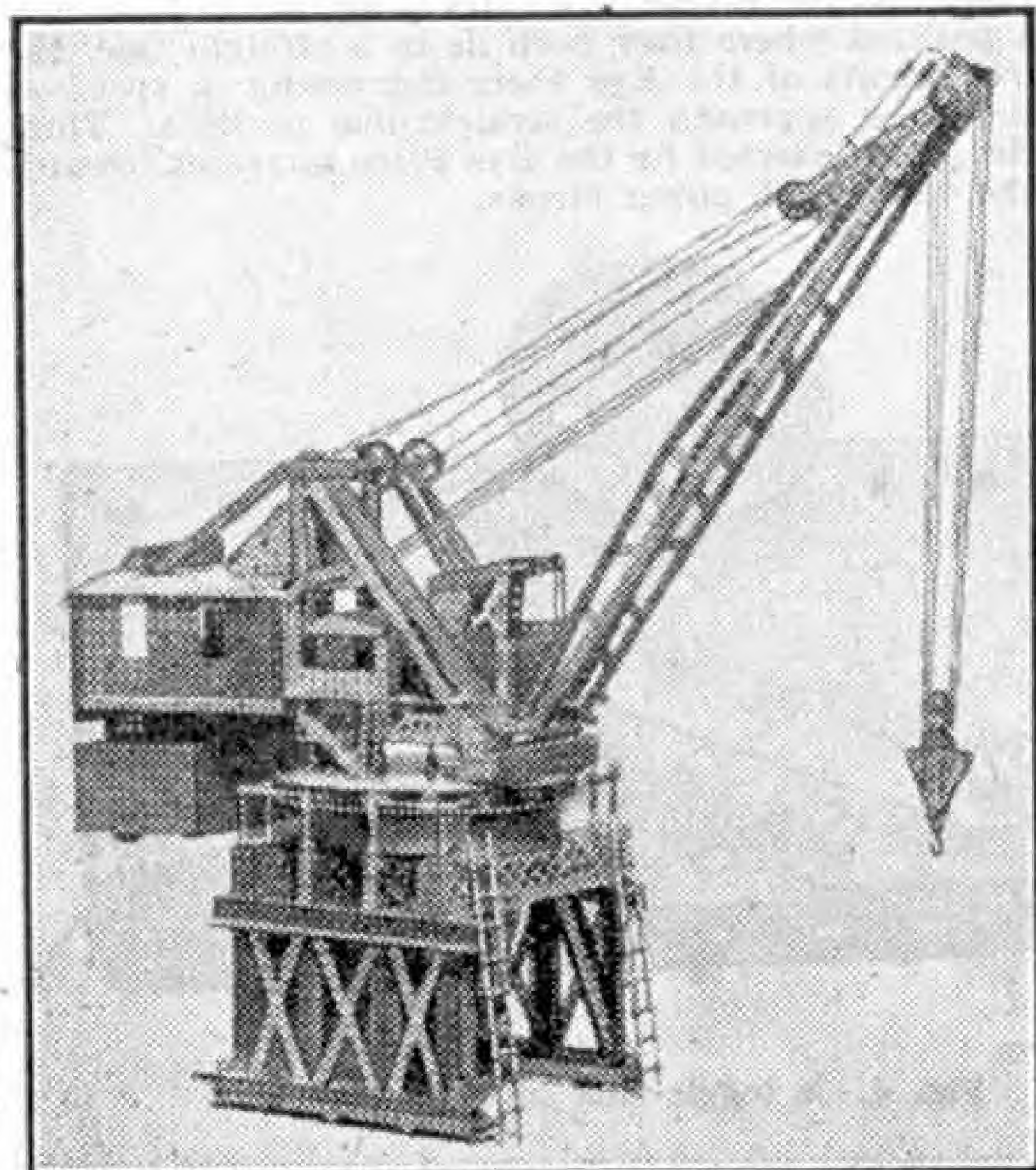


Fig. 1. A powerful model travelling crane built by J. Matthews, Fillongley, Coventry. This model won Second Prize in the "Autumn" Competition.

I know that many of the older Meccano enthusiasts have been engaged in National Service of some kind, which has left them little time for model-building, while a lot of the younger ones have been separated from their Outfits and normal hobbies through evacuation. Whatever the causes may be, however, I am very glad to see the decidedly increased enthusiasm and keenness among model-builders of all ages. Now that a little more space is available in the Magazine I intend to give more detailed accounts of the various competitions and the principal prize-winning entries than has been possible during the war.

This month I am able to announce the results in the Home Section of the "Autumn" Competition, full details of which were published in the September and October 1945 issues of the "M.M."

The list of prize-winners is as follows: 1st Prize, £2/2/-: P. Hancock, Edinburgh 10; 2nd, £1/1/-: J. Matthews, Fillongley; 3rd, 10/6: A Reeve, Melton Mowbray. Consolation Prizes of 5/-: W. Ashby, Astley; P. Winterburn, Ossett; J. Waite, Wakefield; J. E. Meggitt, Ipswich; P. Brown, Oldbury; B. Pitkin, Luton.

The judges had no difficulty in

selecting the entry to receive First Prize. This was quite a change from their usual experience in Meccano competitions, because generally there are several models of apparently equal quality and excellence, and a final decision is reached only after much discussion and a close examination of the details of each model. In the "Autumn" contest, however, a fine model of an imaginary British cruiser, which its builder, P. Hancock, Edinburgh, has named H.M.S. "Rapier," was outstanding among the entries, and its claim to First Prize was beyond dispute.

The model is 7½ ft. in length and is armed with three twin 8 in. gun turrets, two 4 in. guns, two 4.7 in. guns, four 4.5 in. dual purpose A.A. guns, two sets of multiple machine guns and four torpedo tubes. It carries also two aircraft, one of which is mounted on a workable launching catapult, while the other is housed in a hangar below the funnel.

There is an amazing variety of detail work in the structure and fittings of the model, and in most cases where a mechanism of any kind is reproduced, it is workable. For example, the depth charge apparatus and some of the guns are designed to work, the latter firing Washers. There is also an elaborate electric lighting installation supplied from dry batteries, which also feed current to miniature searchlights. I congratulate Hancock on having completed a very fine model and on the excellent way in which he prepared and submitted his entry.

Cranes and excavators are probably the best of all subjects for Meccano models, but it is a long time since I saw a better model of this kind than one that won Second Prize in this competition for J. Matthews, Coventry. A photograph of this model is reproduced on this page, and it will be seen that it represents one of the larger types of travelling dockside cranes and is remarkably well proportioned. It is of course capable of carrying out all the movements usually found in a real crane of this kind, and I imagine that it is also capable of lifting considerable loads.

The other illustration on this page is a reproduction of a drawing of a model showman's traction engine. Both the model and the original drawing are the work of Alfred Reeve, Melton Mowbray, who was awarded Third Prize.

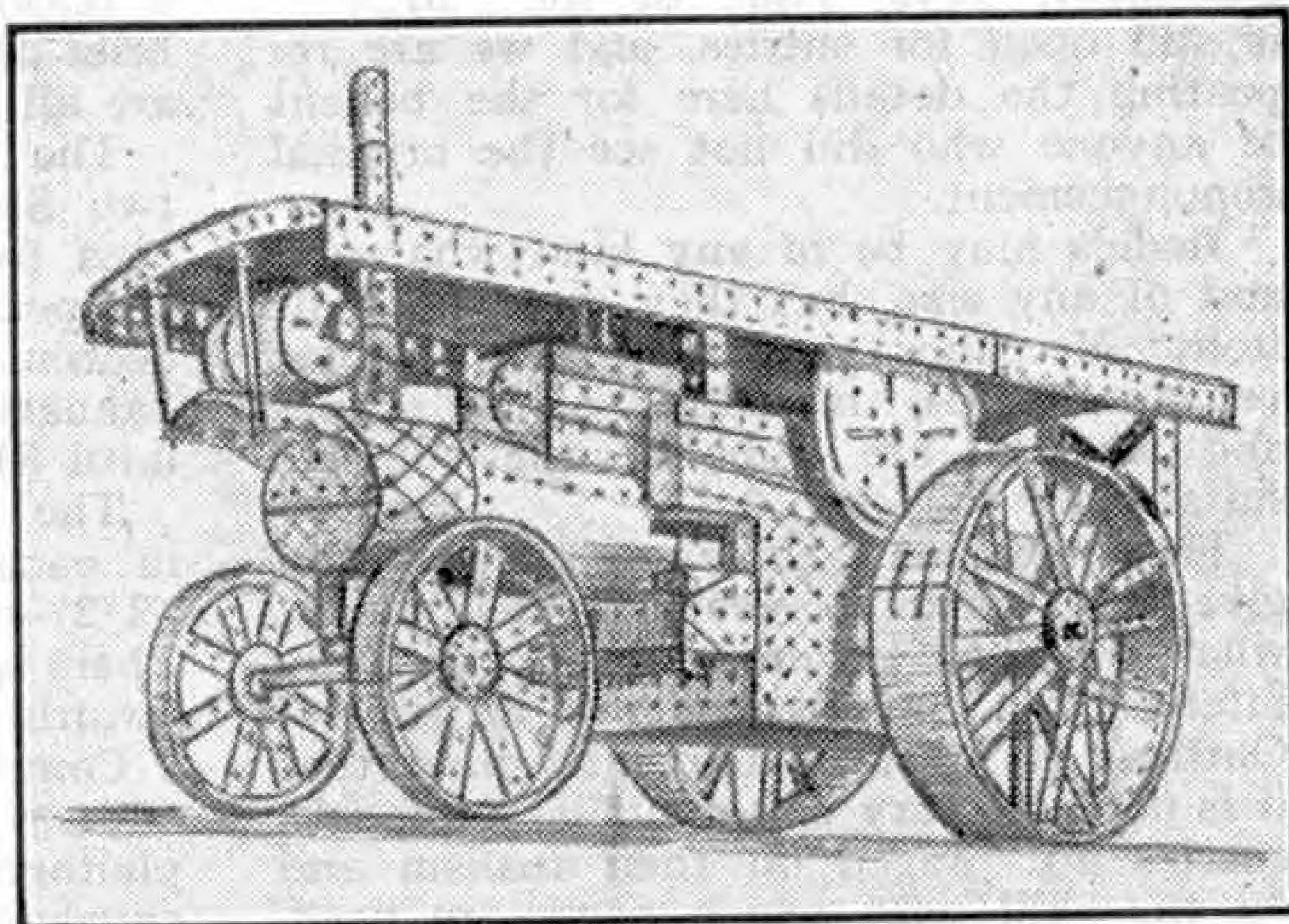


Fig. 2. Alfred Reeve's sketch of the showman's traction engine for which he was awarded Third Prize.



Club and Branch News



WITH THE SECRETARY

A NEW YEAR TASK

This month I have the pleasure of wishing members of the Guild and the H.R.C. a happy and prosperous New Year. We are making a better start than in any year since 1939, and the prospects are bright as far as the Guild and H.R.C. are concerned. For Clubs and Branches too 1946 should be a year of progress. Old established organisations that have been suspended during the war have begun operations, and efforts are being made in various parts of the country to form new ones.

In this revival the best results will only be attained if all Guild and H.R.C. members do their utmost. Those who are not already members of one of these organisations should look round to see if there is one that they can join, and if not they should get their friends together with the idea of starting one themselves. This is not difficult. All that is wanted is that two or three enthusiasts should begin to meet for model-building or for train operations. Others will soon join them and all will begin to get more and more pleasure from their hobbies. Those who do this have no need to be discouraged if they cannot straightaway form a large Club or Branch, with a well-appointed room and an imposing list of meetings. Small Clubs of the friendly type are doing splendid work and I am just as much interested in their activities as I am in the larger organisations.

Whether they join or form a Club or Branch or not, members should remember to write to me often. I am always delighted to hear from them, even if they have nothing particular to say, and I am here to give advice and information to all who are in need of it.

MERIT MEDALLIONS

I want to draw the attention of Leaders of Meccano Clubs to the Merit Medallion, the premier award of the Meccano Guild. This is presented on the recommendation of Leaders to members who show outstanding zeal and merit in Club work. Two Merit Medallions are available in each Session in every Club, and I want Leaders to let me have immediately the names of those whom they think deserving of the award in respect of the first Winter Session, just ended.

PROPOSED CLUBS

TROWELL—Mr. W. Haynes, Moor Farm, Trowell, Notts.

BEXHILL-ON-SEA—Mr. J. Collins, Police Station, Barrack Road, Bexhill-on-Sea.

MORECAMBE—Mr. H. Penberthy, 37, Acre Moss Lane, Morecambe W.E., Lancs.

PUDSEY—Mr. K. Hargreaves, 79, Waterloo Grove, Pudsey, Nr. Leeds.

HAMPTON HILL—Mr. J. E. Brown, 20, St. James's Road, Hampton Hill, Middlesex.

PROPOSED BRANCHES

HOVE—Masters Skelton and Bernardi, 64, St. Aubyns, Hove 3.

BLYTH—Mr. J. Morgan, 12, Maughan Street, Blyth, Northumberland.

Club Notes

WHITGIFT SCHOOL (CROYDON) M.C.—Owing to war conditions the activities of this Club have been suspended, but a beginning has now been made under the Leadership of Mr. F. Broadbent, B.A., LL.B., with G. E. H. Ellis, Esq., B.A., Headmaster, as President. Officials have been elected at a general meeting and there are so many members that two sections have been formed. Great interest is taken in the "Meccano Magazine" and similar literature in the Club Library. A Hornby Train layout is used regularly by each section in turn, the other section meanwhile taking part in competitions. Club roll: 53. *Secretary*: P. Perryman, 10, Buckingham Way, Wallington, Surrey.

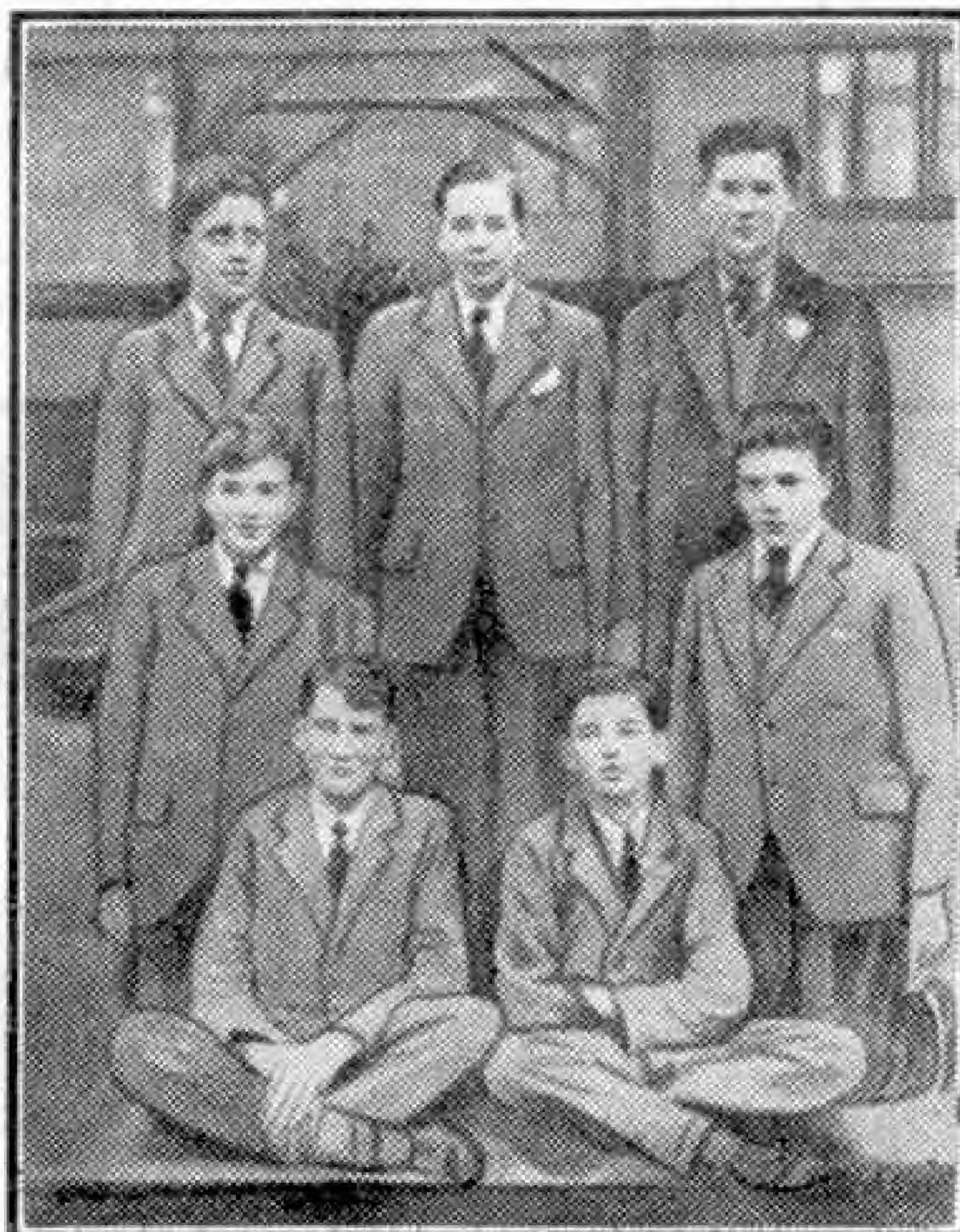
WORCESTER COLLEGE FOR THE BLIND M.C.—Keen Model-building activity continues. A Swivelling Crane with a 4 ft. 6 in. jib and a locomotive and tender over 3 ft. in length have been constructed, and competitions in which each member is allowed only a limited number of parts have also been

successful. A gratifying feature is that those who joined two or three years ago and are now Seniors are taking part in general Club work, helping and encouraging younger members. Club roll: 21. *Leader*: Mr. R. D. Follett, Worcester College for the Blind, Worcester.

BRANCH NEWS

STUART ROAD (EAST BARNET)—A new start has been made with the election of officials. A shed serves as Branch room, and discussions are being held on the track to be laid down in it. Games meetings also have been held. *Secretary*: T. Loader, 12, Stuart Road, East Barnet, Herts.

SHAWE HALL (FLIXTON)—An excellent Branch room has been secured and the track has been designed and constructed. Ample engine power is available and good operations are carried out at meetings, which are held three times weekly. An excellent Library is available and a Magazine is to be run. Football is played regularly. *Secretary*: C. Chatburn, 11, Porlock Road, Flixton.



The committee of the Perse School, Cambridge, Branch No. 485, Chairman: Mr. D. Smith; G. P. Walker, Vice-Chairman, is in the middle of the back row; and H. Rishbeth, also Vice-Chairman, and D. M. Mann, Secretary, are in the second row. The Branch was incorporated in October 1945. An excellent layout is operated, and Film Shows, Lectures and Visits make up a very attractive programme.

Signals on a Hornby-Dublo Layout

SIGNALS fall into the class of accessories that every miniature railway owner feels he must have, but which few, particularly among the newcomers to the railway pastime, understand how to use correctly.

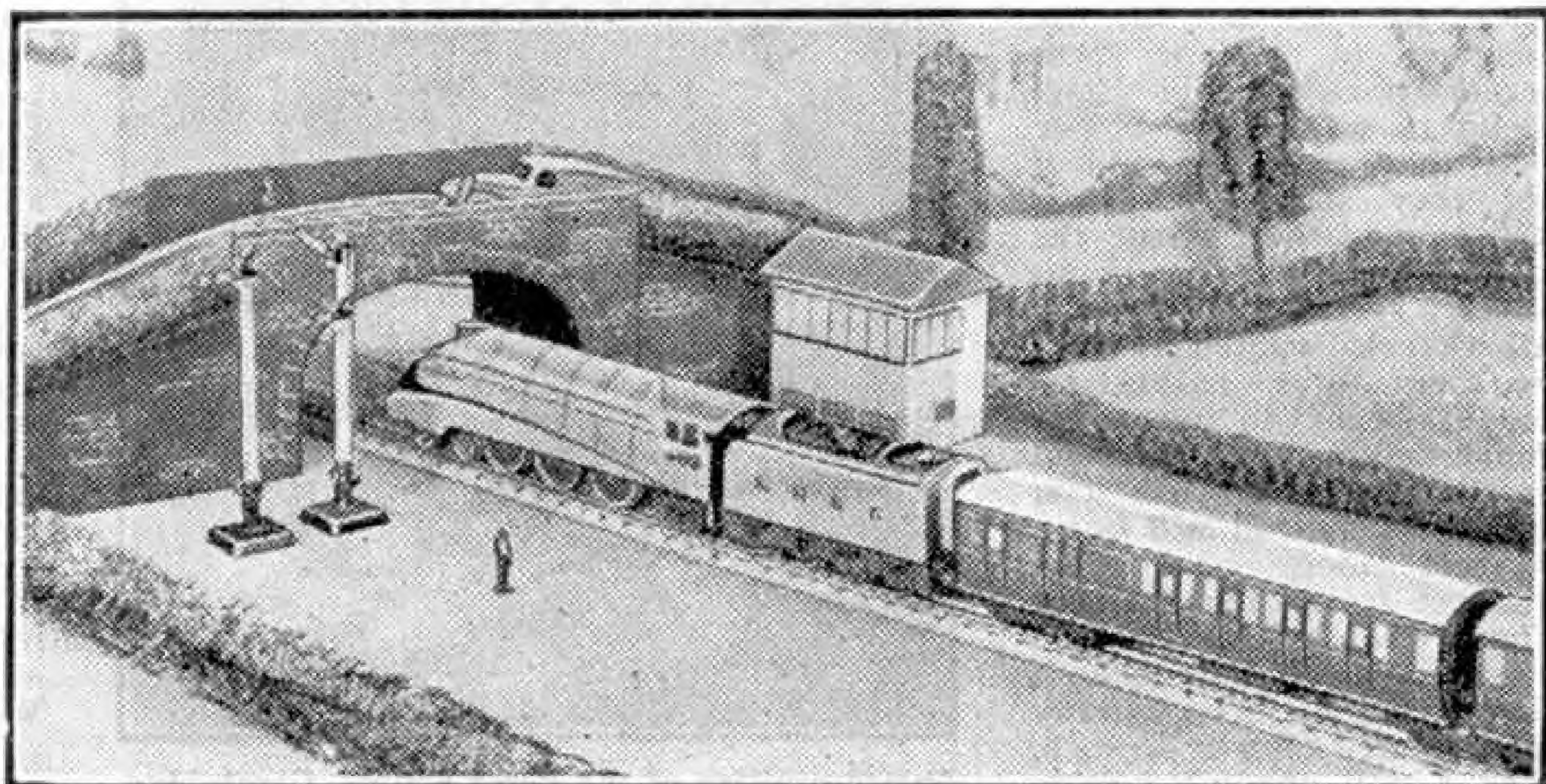
Where a full equipment of Hornby-Dublo signals is not available it is often possible to make use of the slightly smaller Dinky Toys Signals. Failing this many readers have had to make their own during the past few years. As long as the semaphore, which can be of painted metal or even card, can be made to pivot from the posts, quite good effects are possible, even though the operator's finger may have to "flick" the semaphores up or down as required.

The most familiar type of signal to us all is probably the plain single arm "home" signal, that is the one with a square-ended semaphore. This, when displaying the horizontal danger indication, or a red light at night, forms a positive stop signal, and must not be passed by a train

when in this position. Closely allied to it is the corresponding "distant" signal that is distinguished by its yellow arm with a fishtailed notch cut into its outer end. This is a warning signal, and so may be passed when in the horizontal position indicating "caution," or when showing its distinctive orange light at night. It gives the driver advance information as to the state of the next home signal ahead, and therefore is placed well before the home signal. Thus in the event of the home semaphore being at danger the distant semaphore indicates "caution," and there is time to prepare the train for a stop at the home signal if this is still at danger by the time the train reaches it.

Signals of the home pattern are used to protect points that are approached in the trailing direction, one signal governing the straight or main portion of the track

while another is necessary to govern the approach from the branch or siding. This is the situation shown in the lower illustration on the next page. A goods train is making its way out of the siding under a "clear" indication from the siding signal, which is placed on the left-hand side of the track to which it applies as viewed by the driver. The other signal shown in the same illustration is naturally at danger as the road to which it applies is not clear. A train could of course draw up to this signal and stop there until the freight train had passed the next home signal along the line. To lessen the possibility of a train overrunning the points in these circumstances, the main line signal

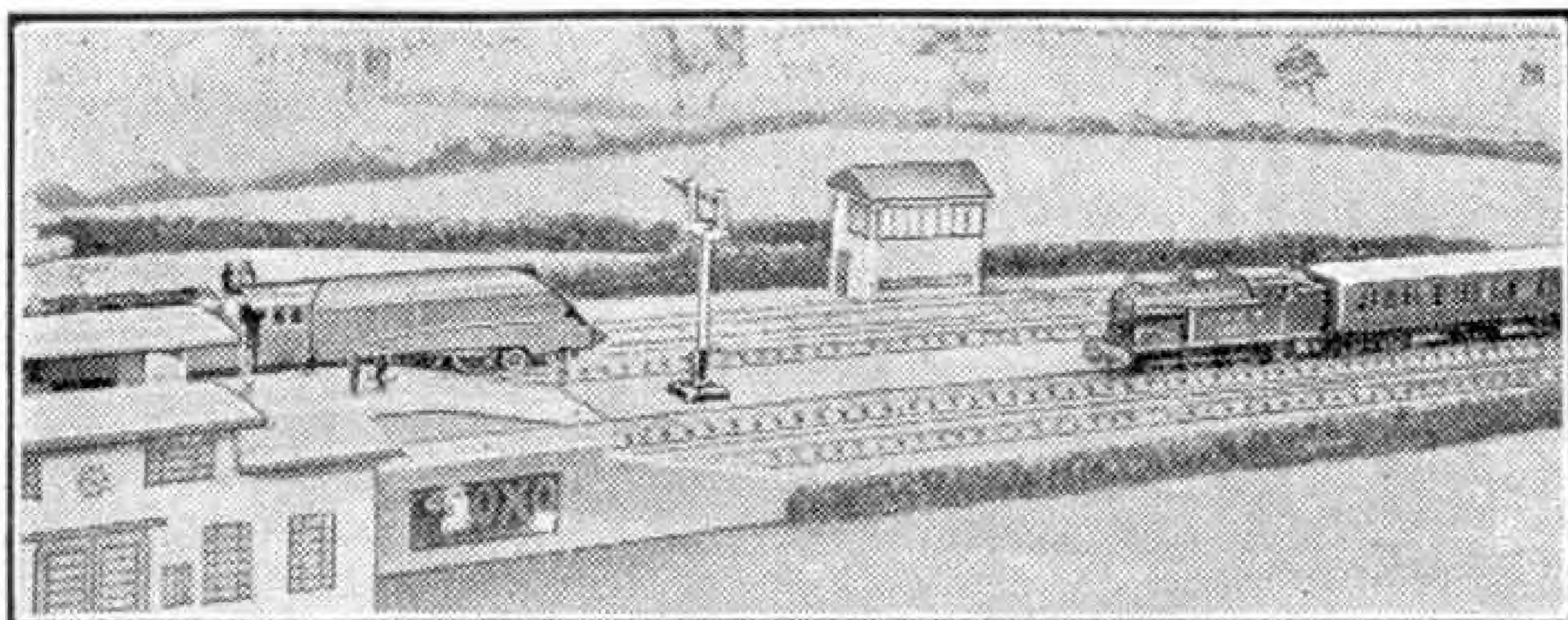


"Section clear, junction blocked" Hornby-Dublo Signals are used together here in a special situation as explained in this article.

is set back some distance from them as is evident from the illustration.

Approaching points on the main line in the "facing" direction, that is so that the points offer us a choice of routes, what type of signal should we expect to see? As a rule the answer is a junction signal, consisting of a main post which branches out as it were into a horizontal cross member on the outer end of which are smaller posts, each carrying a semaphore arm of the home pattern. If the points diverge to the left, the left-hand semaphore applies to the diverging track and the right-hand one to the straight road ahead. If the points are right-hand, that is with the branch to the right, then the opposite is the case.

Those who do not happen to have a junction signal need not despair. They can use instead two single-arm signals



"Waiting for the signal." The Junction Signal in this illustration is used to govern two parallel tracks for traffic in the same direction.

side by side; this is often done on real railways and the semaphores are in the same relative positions and give just the same indications as if a junction signal were used.

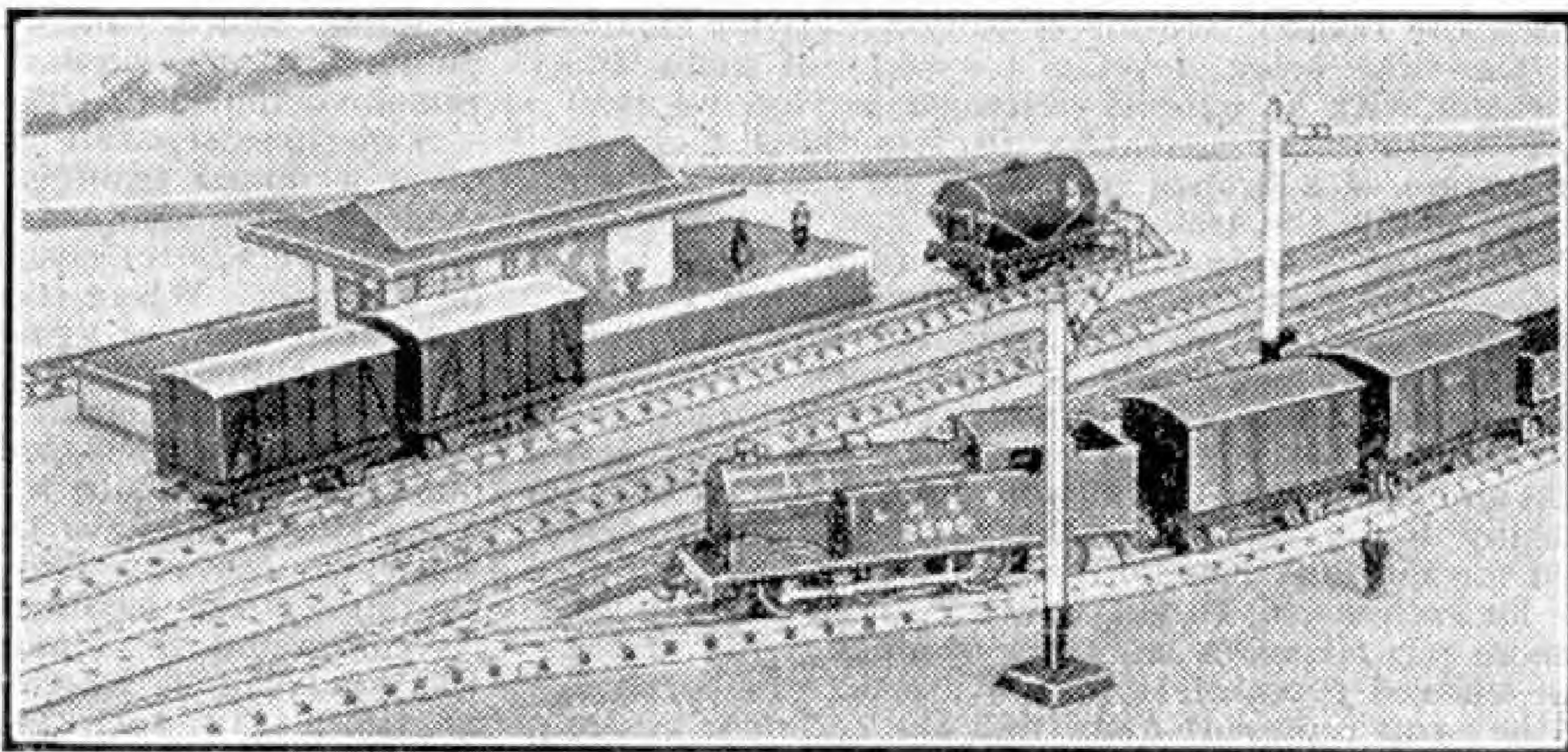
Conversely, two adjacent parallel tracks conveying traffic in the same direction can be signalled by means of a junction pattern signal, instead of two separate signal posts. This is quite a convenient arrangement, and the junction signal should be placed where it is best for sighting by the driver of an approaching train. Thus in the upper illustration on this page a junction signal is shown to the right of the two tracks to which it applies, instead of being, as one might expect, between them. A curved approach to the station from the left, however, makes it desirable to place the signal as shown, where the station building of the main line station does not impede the view to such an extent as would be the case if the signal were placed between the tracks concerned, or to the left of them.

A type of signal that is most effective on a miniature railway, but one which is rather puzzling, is the double arm signal

which has two arms mounted on the one post. The upper one is always of the home pattern and the lower a distant. This is most useful in miniature because it is used where signalling sections are short and the only way to include a distant semaphore a reasonable distance in advance of the home signal to which it applies is to place the distant on the

the same post at "danger," as this would be a conflicting indication.

In the illustration referred to, the use of an additional distant signal alongside shows that the next signal ahead controls points diverging to the left of the main track, the additional distant being on the left of the main or double arm signal. The indication shown here is "section clear, junction blocked." With a clear road through straight ahead both arms of the double arm signal would be at "clear"; with a clear road through the points to the left, the single arm distant and the upper arm only of the double arm signal would show "clear." The use of the two signals together in this way provides complete information in advance of the state of the road at the junction,



While the freight train leaves the siding, the points on the main line are protected by the main home signal at "danger."

and from the spectacular point of view they look quite attractive and imposing.

A similar arrangement could be used in connection with a divergence to the right from the main track. Then the single arm distant would be placed to the right of the double arm signal. But with neither arrangement could both distant arms be at "clear" together.

same post as the preceding home arm. This type of signal is shown in the illustration on the opposite page. The home arm may show "clear" and the distant "caution," or both may show "clear"; but the distant must not show "clear" with the home arm on



A "mixed train" on a single-track Hornby layout representing a branch line railway. The passenger vehicle is a No. 2 Corridor Coach.

Fun With Your Hornby Railway

"Making-Do" with Miscellaneous Equipment

AT the present time, when so many miniature railway systems are being developed with miscellaneous equipment got from various sources, many Hornby railway operators are writing to the Editor for help in making the best use of their material. The following notes should prove useful to beginners, and should give a few ideas to more experienced operators.

As a general rule the question of the exact layout to use does not present a great deal of difficulty. The space available is normally restricted nowadays, and so governs the form of the system to a great extent. Single track is the rule more often than not, and the station and siding arrangements are likely to be of the simplest kind. Signalling may be extremely elementary or possibly may not exist at all.

All this may seem very unpromising, but it is still possible even in such circumstances to work out a reasonably realistic scheme of working. If we cannot for the time being develop a system of main line character with an express passenger service, we shall have to turn our attention to something more in the nature of a branch line or "light railway." Let us talk about the trains first.

Frequently a wide assortment of rolling stock is to be found on a branch or light railway, even though the actual number of vehicles in use may be small. This naturally suits our scheme very well. The more remote branches of our real systems often have odd vehicles of types not found on main lines, and this applies also to light railways. A set train of Hornby No. 1 Coaches makes a neat and effective load for the tank locomotive that is the best type to use for such work. It will, however, be in order to use a more miscellaneous assembly of stock. Any of the four-wheeled types of Hornby Pullmans can be used, as they can represent quite well the end-door centre gangway pattern of vehicle that is found here and there on branch or light railways.

On the other hand if we have only bogie passenger stock and a tender locomotive we can still use them effectively. Tender engines are found on branch lines, even though they may have to spend half their time running tender first. This method of working in miniature has a special attraction for some enthusiasts, so that here they have a good reason for indulging their fancy. Real tender engines used regularly in this way are sometimes found with a "weather board" erected on the front of the tender for better protection of the crew when working backwards. Here then is a simple addition that can be made, using a suitable piece of card or even thin wood. Nothing elaborate is necessary, just a plain

piece of whichever material we choose, fitted across the front of the coal space and provided with a couple of holes to represent the "spectacles" or look-out windows.

Bogie stock can be used where available, and the Hornby No. 2 Saloon or No. 2 Pullman Coach is specially effective for this purpose in view of its end-door character. Alternatively the No. 2 compartment-type coaches can be employed, either as a complete train, or alone, or else coupled to the No. 2 Saloon. This reminds us that branch lines are sometimes operated by a pull-and-push unit; the engine hauls its train in one direction, but in the other direction arrangements may be made to enable the driver to work the engine from a specially-fitted compartment at what is alternately the head and the tail of the train, according to the direction in which it is moving. Thus there is no need for "running-round" facilities, which means the installation of crossover points or some similar arrangement, as the engine remains coupled to the same end of the train.

Sometimes separate goods trains are run, but quite often a mixed train is operated, one or two goods vehicles being coupled in the rear of the passenger stock. This is the situation shown in the illustration on this page. Where traffic is light it saves the engine a separate trip, or avoids the use of another engine, which might complicate things on a single line operated only on the "one engine in steam" principle.

With a more developed branch line we could expand our single track into a double road passing place at a station, if we have the necessary points to do so. Then we can run two engines, or trains, the one waiting on the passing loop while the other makes its run round the single track section. Working of this kind can be interesting and even quite exciting at times. In such circumstances some signalling equipment is desirable, if only to show which passing road is clear, or to indicate that the train will stop at the station concerned. Apart from stations, the ordinary stretches of track can be without signals, unless we are lucky enough to be well provided with these accessories. They do add a great deal to the attractive appearance of a layout.

Level crossings are usually common on lines of the kind we are considering, so that we should try to arrange one at least of these. Mention of these items reminds us that we shall no doubt wish to include some representation of a road or two among the lineside features. Branch and light railways often run near to or parallel with a road for considerable distances; this is quite a useful thing to remember when our layout space is restricted.

Jack Frost Stops the "Juice"

By "Shed Superintendent"

ICE formation on the conductor rails has given trouble from time to time on railways using the third-rail system of current supply, but, as a tribute to the electrical engineers, it must be said that

It was finally decided to set up an emergency service, using steam engines to haul electric trains, which were worked under the rules governing freight trains, the engines not being Westinghouse-fitted.

Speeds, for obvious reasons, were slow. No heating could be provided for the passengers, but fortunately they entered into the spirit of the affair, and City men made their daily journey to London muffled and garbed like their grandfathers in the days before foot-warmers were provided.

Eventually the frost went away, the electrics ran again under their own power, and the steam drivers went back to their ordinary jobs, chuckling at having saved the day with the

good old Iron Horse. It may be some time before such a contretemps occurs again, for a service of empty or "ghost" trains at night in hard weather is usually sufficient to keep the rails clear when the normal traffic is not running.

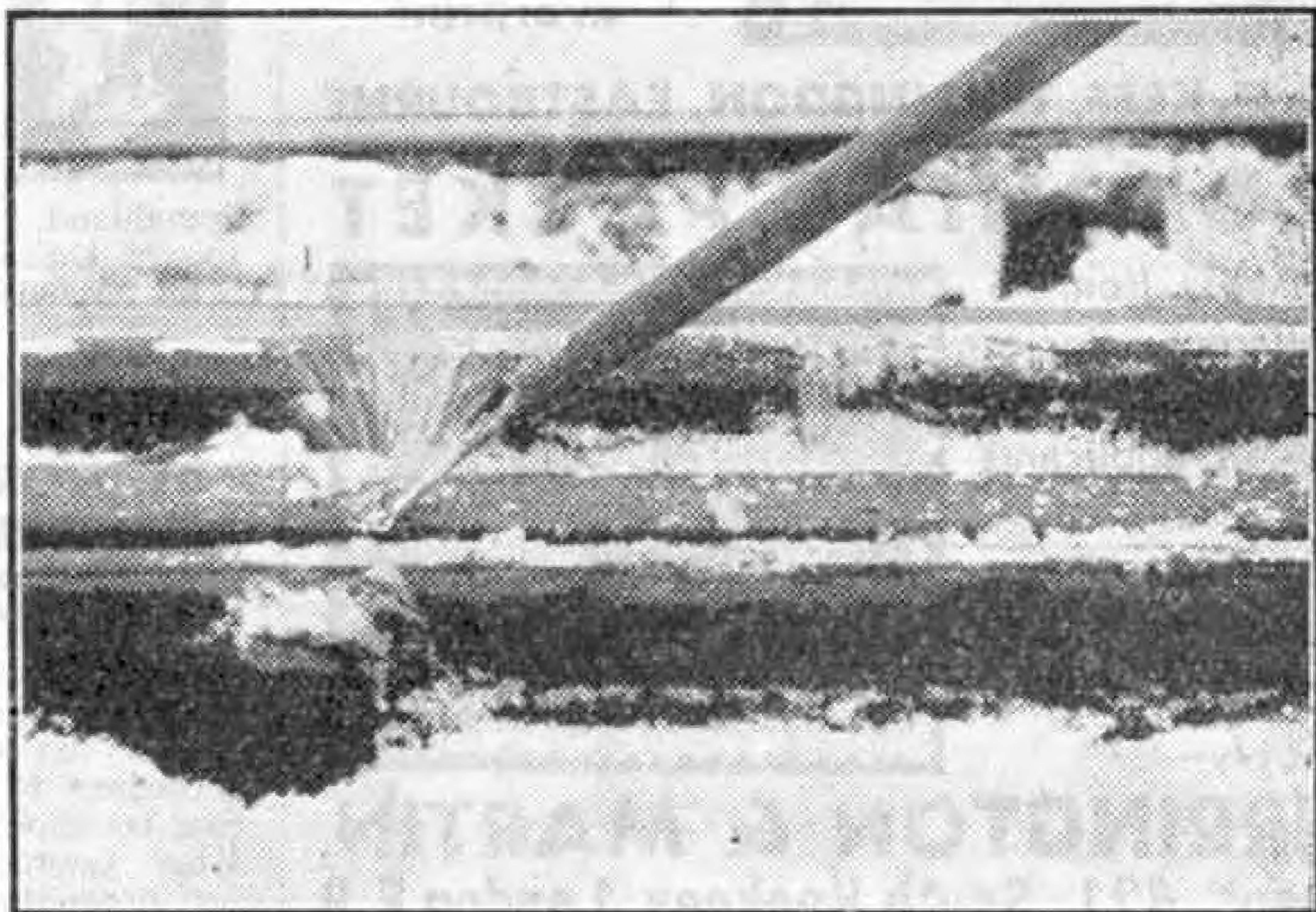
The photograph below shows vividly how tough the ice-film can be, and explains why no simple and effective remedy has so far been propounded.



An electric train is stranded.

serious dislocation of the traffic seldom has occurred.

The story can now be told, however, of that dismal week at the end of January 1940, when Jack Frost succeeded, where Goering failed, in stopping trains in the South of England. The conditions were exceptional. The mist and cold hung about for days and provided the ideal conditions for serious ice formation on the rails. Ice, a quarter of an inch thick in places, could only be dislodged by scrapers. Engines with steam jets were called into action, without success. No sooner was one section cleared than the ice formed again, between the passing of trains. Electric trains became stranded en route, very often through damage to the switchgear caused by arcing. The reason was that, when the pick-up shoes ran on to a portion of rail partly insulated by ice, a heavy arc was drawn as the shoe passed from the "live" to the "dead" section. Brilliant flashes lit the night sky.



Scraping the ice off the conductor rail.

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Stamp Collecting

The Stamps of Fiji

By F. Riley, B.Sc.

WE remain in the South Pacific in our Empire stamp tour this month, calling at the Fiji Islands. Usually these are only noted on large scale maps, with the result that we think of them as being two in number, Viti Levu and Vanua Levu, but the islands are themselves fairly large, the first having an area of over 4,000 square miles and the second of over 2,000 square miles. Actually there are altogether about 250 islands in the group; and 80 of them are inhabited; their total area approaches that of Wales.

To some of us Fiji is perhaps best known as the scene of pioneer missionary effort in the South Seas, and we have been thrilled by stories of native warfare, cannibalism and witchcraft. These of course are now matters of historical interest only, for the Fiji Islands are Crown Colonies, inhabited by orderly people who are developing their agriculture under the guidance of their rulers. They are healthy, with an excellent climate, and to-day produce large quantities of sugar and molasses, rubber, plantains and bananas. The coconut palm too is more and more extensively grown, and copra, the dried kernel of the nut from which coconut oil is made, is one of the chief exports.

The Fijian is a fine type, of muscular and athletic build, and is very energetic. Although in the capital European ways are largely followed, Government offices employ native clerks, and

there are Government technical Schools for the training of smiths, carpenters, and other tradesmen, the inhabitants still live happily in their villages, in houses built of tree trunks with grass thatches, that look like small haystacks.

The stamp story of Fiji is a somewhat mixed one. It began in 1870, when the islands were still controlled by the native King, Cacobau, who had already tried in vain to persuade Great Britain to take his country under protection. The earliest stamps were crude but interesting. They were printed at the office of "The Fiji Times," and had on them the name of this newspaper, with the words "Express" and "1 Penny," the figure appearing in the centre. Apparently these stamps were used for local



correspondence. They were followed a year later by stamps of a more usual design, in the centre of which was a crown and the initials C.R. Until January 1872 the

values were in shillings and pence, but in that month an issue in cents appeared for some reason.

Two years later there came a great change, for at last Great Britain accepted the suzerainty of the islands, and the event was marked by the overprinting of the letters V.R. on the existing stamps.

The stamps of the Fiji Islands were now definitely British in character and they followed the usual course. Issues appeared with the portrait of Queen Victoria, and later came stamps of the "Tablet" type with portraits successively of Edward VII and George V. All of these were very interesting to stamp collectors, particularly specialists, but we need not stay here to discuss them in full. In 1935 came the Silver Jubilee issue, followed in 1937 by Coronation stamps. The first of these two sets used the well-known Windsor Castle design and the second bore portraits of the King and Queen.

Fiji fell into line with other British Crown Colonies by the appearance of a splendid issue of pictorials in 1938. Like other South Sea islands that have already been visited in this tour, Fiji offers splendid opportunities for effective designs and full advantage was taken of this, in a long series up to 5/- in value and mostly in two colours.

The natives of Fiji have always eaten large quantities of fish and have revelled in sea life. In view of this it is not surprising to find that native sailing canoes figure prominently in this pictorial issue, and examples can be seen on three of the stamps reproduced on this page. These are the 1d., 1½d. and 3d. values, and the last of these carries also a representation of the arms of the colony, in an oval similar to that used on all values to carry the portrait of King George V. Yet another stamp illustrating the Fijian association with the sea is the 1/- value, which shows a native wading deep in the sea with a lighted torch in his left hand and a spear in the other ready to thrust it into the water to catch a fish.



The 1d. value helps us to picture the Fijian native at home in his villages, and the 5/- value, which is not reproduced here, shows a chief's house. The building on the 2d. value, reproduced on this page, is Government House. The original 2d. value reproduced a map of the islands, as did the 6d. value, but later the same map appeared on a new 2½d. value, and a 2½d. on a 2d. value also appeared with this design. The series is completed by four other values.





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Stamp Gossip and Notes on New Issues

By F. E. Metcalfe

MOST of the world appears to be turning out as many stamps as presses can produce. France of course is the most energetic. As usual the pictorial stamps of this country are of a high artistic order, but about the last thing that most of them are used for seems to be the prepaying of postage. But what does that matter? Stamps have long since advanced well beyond that stage. All countries, with the exception of Great Britain, have proved stamps to be the finest and cheapest publicity medium in existence. Maybe one day even our own country will tumble to the truth of this statement; in the meanwhile we collectors will have to be content to see good money going abroad to pay for the only stamps there are for us to gather.

Of course this has its funny side. We cannot have Victory stamps because "the available manpower, machinery and material does not permit the emission of a special postage stamp." Yet we are actually producing 11 Victory postage stamps for New Zealand! Incidentally the date of issue of these New Zealand Victory stamps is 1st March 1946. Those being overprinted for use in Cook Islands, Niue and Western Samoa, in the South Pacific, will be issued on the same day.

By the time these words appear in print the Victory stamps for South Africa will have been issued and next month it is hoped to illustrate specimens. It was known that, as usual with such special issues, these stamps would be overprinted for use in South

West Africa, but the news that they are also to be overprinted for Basutoland, Bechuanaland and Swaziland caused great surprise.

This apparent connection between the Union and the Colonies named is very significant. As we were told in the newspapers some time ago, the British Government had agreed that South Africa would be allowed later on to absorb these three territories. Apparently this operation is actually taking place now, and this means that the current stamps may soon be changed, for it doesn't take the Union months and months to turn out a set of stamps, once it decides to do it. So this month our tip must be that collectors should fill up any gaps in current stamps of these territories just as soon as possible. Swaziland stamps have been selling very well for a long time. The shade and perforation varieties have drawn collectors' attention

to them, but there must be many collectors who have not yet bought their sets of Basutoland and Bechuanaland.

These Dominion and Colonial Victory stamps have caused quite a bit of excitement among collectors, but most attention has been paid to the unfolding story of what the Japs did philatelically during the occupation of our Eastern Territories. As far as can be gathered, in each case they overprinted what stamps they found and then produced sets of crude labels by the million. Some time ago we illustrated one of the labels they printed for use in Burma. This month we are illustrating one of the stamps, part of a set of 10 issued for use in Malaya. After all, the stamps they found there on their entry had been used up.

Now that the Japs have been kicked out, our authorities are bringing back the old stamps and overprinting them in some way, to distinguish them from those which may have been looted. We are illustrating one from Singapore and it will be remembered that last month we showed one from Burma. Incidentally all

the various stamps used before the war by the Federated and Unfederated Malay States are not to be issued again. Instead there is to be one issue for the lot, and as they were anything but popular with the average collector, it is probably a good thing too.

The U.S.A. continues to push out new stamps. One that is sure to cause some controversy is issued in honour of the late governor of New York, Alfred E. Smith. That popular country Mozambique has also issued a set in commemoration of the fourth centenary of Lourenço Marques. Our illustration is that of the 20 escudo value, a handsome stamp in black.

Many words of warning have been uttered regarding stamps issued during the occupation of Europe by the Germans. At the time these stamps were being smuggled into this country, and they were making high prices. Those who disregarded the advice must be feeling very sorry for themselves, for most of these stamps are now at only a fraction of the price they were then. And not only collectors have been caught; some dealers who should have had more sense have been left with unsold stock, and they are now trying to clear at half the price they paid.

Be all that as it may, these stamps are exceedingly beautiful in the main, and while our own Colonials will probably prove a better buy in the long run, those who want the "New Europe" issues should be pretty safe in paying the prices ruling to-day. In fact, a number have already risen in the last month. Collectors will be glad to hear that Gibbons are tackling these "War" stamps and so in time, the chief drawback to their collection, lack of a catalogue, will be removed.

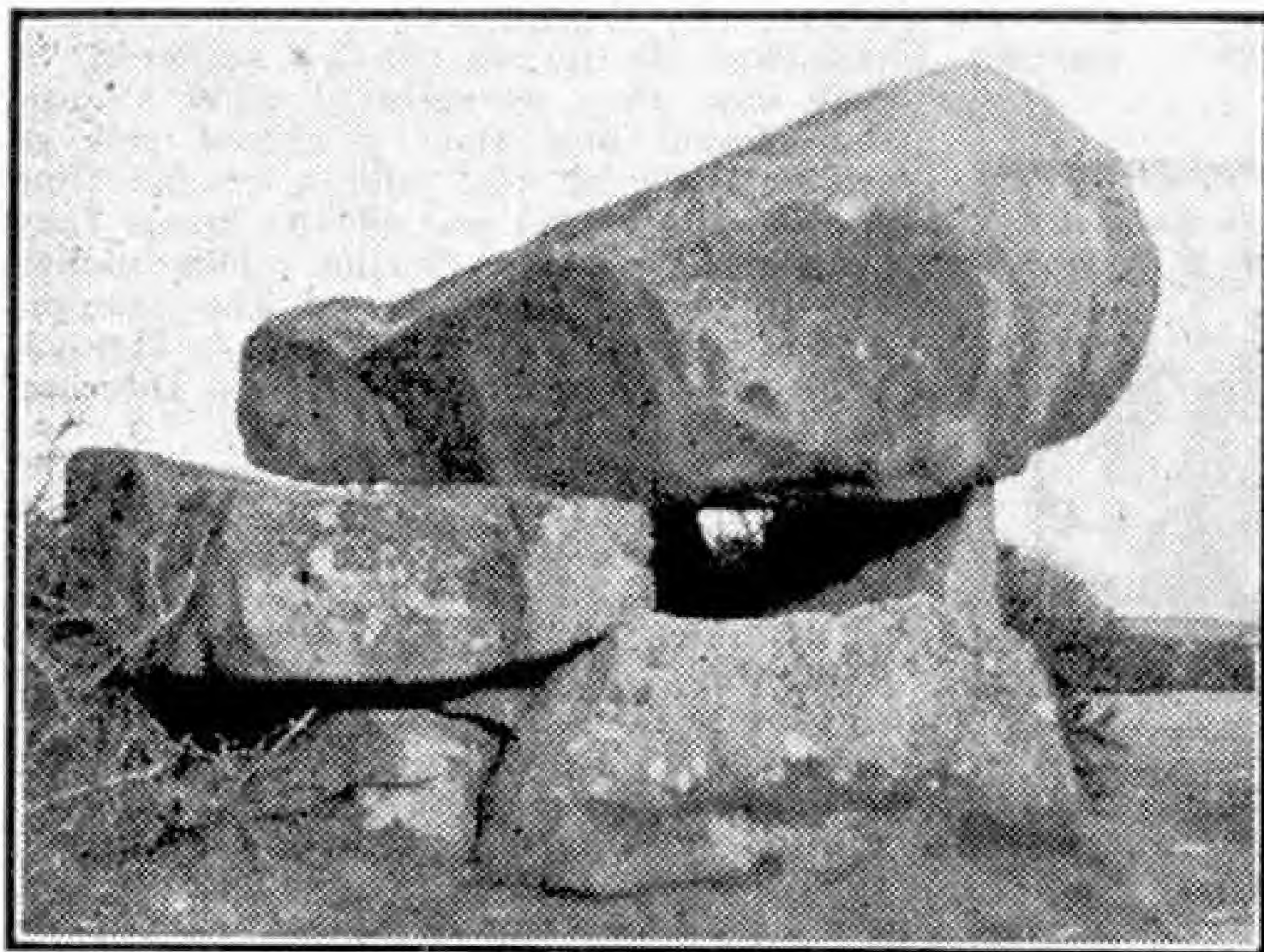


From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

AN IRISH DOLMEN

A dolmen consists of an unhewn stone poised on two or more unhewn uprights, and the one seen in the photograph reproduced on this page is in Co. Down, Northern Ireland.



A dolmen in Co. Down, Northern Ireland. Photograph by E. Porte, Belfast.

Dolmens originated as sepulchres for important people of prehistoric times and they used to be covered with earth or stone. They are sometimes mistakenly called cromlechs or Druid altars. There are a few in England, and many exist in Ireland and throughout the Continent.

N. J. CONNELL (Belfast).

SEEN FROM A BRIDGE

When returning from a cycle tour recently I halted on a bridge for a rest, and on looking over the parapet, I saw the strange but graceful craft shown in the accompanying illustration. This appeared to be made from three auxiliary petrol tanks of the type used on aircraft. The centre one was reserved for the helmsman and the motor, and there was a seat in each of the side ones for passengers.

What a glorious opportunity for anyone living near a river such a craft as this would provide. Even if no engine were installed and paddles had to be used, think of the fun, and the thrill of seeing places from the water lanes that cannot be seen from the roads.

C. THOMPSON (Luton).

QUAINT RAILWAY JOURNEYS

While travelling abroad in H.M. Forces I have had some unusual, interesting and often uncomfortable railway journeys. Once I travelled on the metre-gauge railway from Bagdad to Basra. We started off with an issue of three days' rations in case of breakdown! No breakdown occurred, however, and we spent 24 hours in the crude third-class carriages, wriggling about every few minutes on the hard wooden seats, such as are found in the utility buses of England to-day. The temperature was between 110 and 120 deg. F. and the breeze blowing through the "no glass" windows was very welcome. Later, as we got out into the desert, the sand streamed in

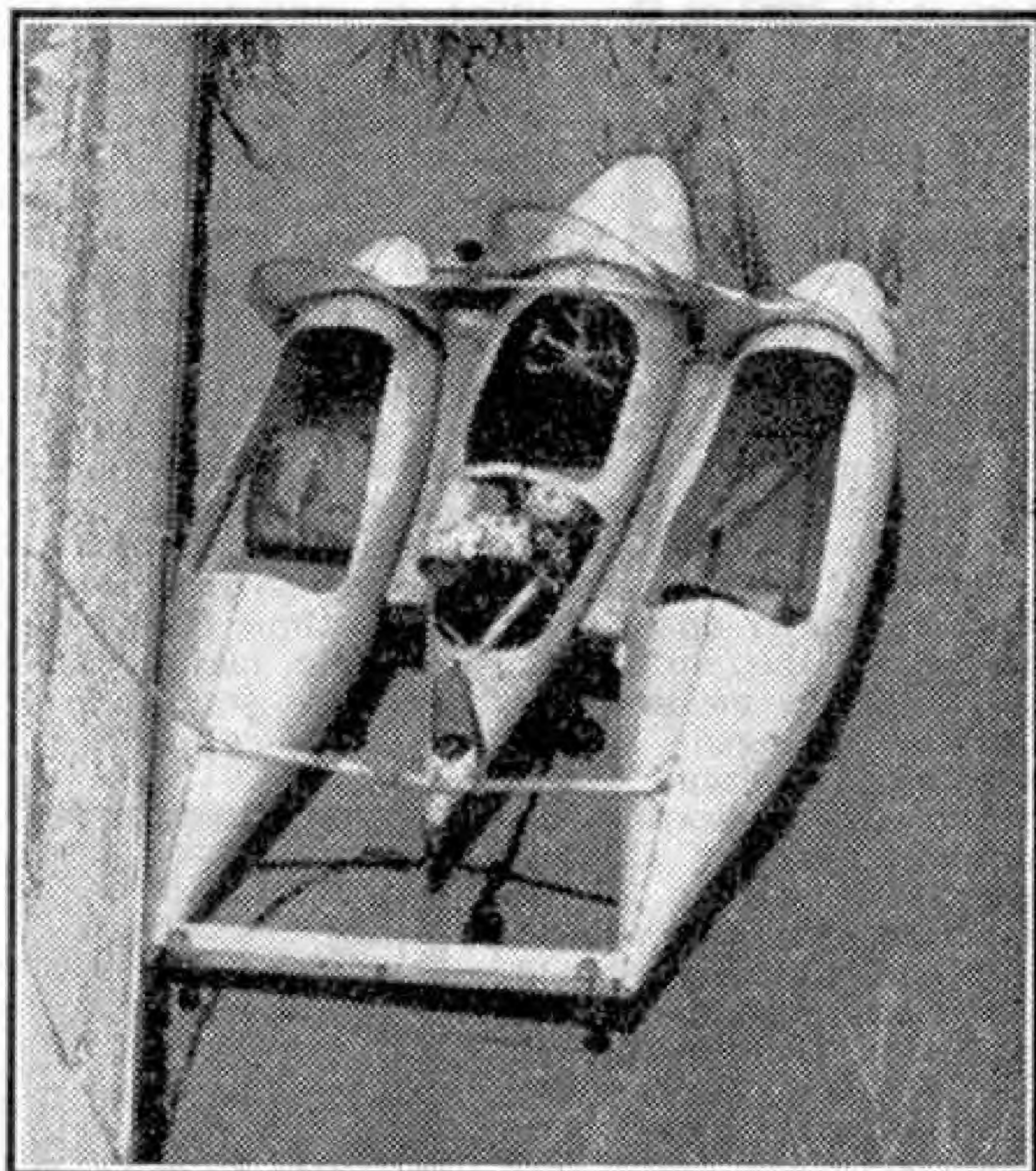
through the windows in spite of the wood-slat cover, that we put up. We arrived at Basra stiff, dusty and thirsty.

The Cairo-Haifa run, which takes 18 hrs., is much better and is run to timetable. The Suez Canal is now crossed by a swing bridge near Ismailia. After a drab trip across the Sinai desert, the train reached El Arish, which immediately brought to mind the lovely oasis scenes often described in books, but so rare in reality. Here the blue Mediterranean laps the golden beaches, and thousands of palms provide welcome shade. Soon the Palestine border was passed, and we saw men and women of nomadic tribes whose history dates back to Bible days. Then we approached the cultivated region, where immense orange groves flourish in the lovely sunny climate.

Lydda, the main junction in Palestine, came next. It is one of the few stations of the line with actual platforms, signals, etc. Shortly after passing Benjamina the line again touched the Mediterranean shore, and a little later we were in the outskirts of Haifa, which is overlooked by Mt. Carmel.

My most amusing trip was on the Italian railways between Taranto and Brindisi. The train struggled up the gradient from Taranto and continued gamely for some time, but shortly afterwards we began a lengthy climb and progress became slower and slower. Finally we stopped. We assumed that the engine crew were getting up steam; but, to our amazement, the guard got down and calmly uncoupled the rear half of the train. The engine then crawled up the gradient with the first half, and later returned for the rear portion.

D. H. TOMKINSON (Crewe).



A novel river craft fitted with a petrol engine. Photograph by C. Thompson, Luton.

Competitions! Open To All Readers

Which Were the Most Popular Covers in 1945?



January is the month in which we give readers the opportunity of telling us which of the previous year's covers they like best, and here is our 1945 Cover Voting Contest. The 12 covers concerned are reproduced in miniature above. These reproductions are not in colour, and so do not convey the brilliance of the originals.

All that is required from entrants in this contest is to state on a postcard: A, which cover he likes best; and B, what he thinks will be the order of popularity as decided by the votes of all competitors. The covers must be referred to by the names of the months in which they appeared, and it is not necessary that a

competitor's own favourite should be placed at the head of list B, which should represent his idea of popular opinion of the covers.

In this contest there will be the usual separate sections for Home and Overseas readers, with prizes of 21/-, 15/- and 10/6 respectively in each. In addition there will be consolation prizes for other good efforts. Competitors must remember to put their names and addresses on their postcards, which should be addressed: "1945 Cover Voting Contest, Meccano Magazine, Binns Road, Liverpool 13." The closing dates are: Home Section, 28th February; Overseas Section, 31st August.

A Locomotive Contest

Competitions in which clues to the names of British locomotives are given have always proved very popular with our readers, so we are again giving them a Contest of this type. The clues in each case are more or less of the crossword type. Some easily lead to the name of the locomotive indicated, but others will require just a little consideration. When the name has been found the owning company and number should be added to complete the solution in each case.

The number of locomotives the names of which are required in this competition is 16, and the clues are as follows:

1. Broad-acred county.
2. Moves on track in the skies.
3. River famous for battle.
4. Fabled land that has a railway.
5. Did she live in the water?
6. Coloured war missile.
7. Extra paid for this on holidays.
8. Book or castle? Both.
9. Should be a perfect locomotive.
10. Sent from heaven.
11. School by famous hills.
12. Sounds insulting, but is an honour.
13. Was this the first locomotive?
14. Should be unusually powerful.
15. Useful for firing.
16. Suggests a question.

The Contest is divided into the usual two sections, for Home and Overseas readers respectively, and in each prizes to the value of 21/-, 15/- and 10/6 will be awarded for the best solutions. If there is a tie for any prize neatness and novelty will be taken into consideration by the judges. Entries must be addressed: "January Locomotive Contest, Meccano Magazine, Binns Road, Liverpool 13." The closing dates are: Home Section, 28th February; Overseas Section, 31st August.

January Photographic Contest

This month's photographic contest is the 1st of our 1946 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if the entrant desires.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: "January Photo. Contest, Meccano Magazine, Binns Road, Liverpool 13." There will be separate sections for Overseas readers.

In each section prizes of 15/- and 7/6 will be awarded. Closing dates: Home Section, 31st January; Overseas Section, 31st July.

Hawker "Tempest" II—(Continued from page 9)

after a time rose to a crescendo as the "Tempest" strained against its chocks, seeming impatient to get up into the air.

A few minor adjustments were made and then the new fighter was ready for flight. As it was towed off to join a long line-up of other machines on the airfield, a "Tempest" II roared across the aerodrome at "nought feet" and then shot up in a wonderful climbing roll, with filmy vapour trails coming from its wing-tips. It was flown by "Bill" Humble, Hawker's No. 1 experimental test-pilot, and the superb exhibition of high-speed aerobatics that followed proved more than anything else that in the "Tempest" II the Royal Air Force has a sturdy, highly manoeuvrable and aggressive attack fighter, second-to-none in the world.

THE WHITTINGHAM RAILWAY

By H. M. LIVESEY

The Whittingham Railway is the only independent standard gauge steam railway in Lancashire operating passenger trains. It is owned and managed by the County Health Department and runs between Grim-sargh, on the L.M.S. single-track Preston and Longridge branch, and Whittingham Asylum. The line is single track, about 1½ miles in length, and is roughly in the form of a letter "U." It is laid with light chaired rails, which are in generally good condition, but the sleepers are much overgrown with grass.

Traffic over the line consists of passenger trains conveying visitors and staff to and from the Asylum, and occasional goods trains carrying the more bulky supplies required there, such as coal and coke. There are two locomotives, both built by Barclay's of Kilmarnock. One is an 0-4-0 outside cylinder saddle tank dating back to 1888. The other was built in 1904, and is an 0-4-2 side tank with outside cylinders. An interesting feature of the locomotives is that each carries two lamp irons side by side, in front of the chimney, as was once the practice on the former Lancashire and Yorkshire Railway.

The line boasts three very ancient second-hand passenger coaches; all are four-wheelers, and are probably the only ones now running in Lancashire. The railway is still quite busy, and the antique train with its tiny locomotive presents a most amusing picture as it rattles its way through the gently undulating countryside.

COMPETITION RESULTS**HOME SECTION**

August "Summer Doublets" Contest.—1st Prize: D. Wheelhouse, Nottingham; 2nd Prize: R. Tydeman, Ipswich; 3rd Prize: T. Hill, Bolton. Consolation Prizes: I. Mitchell, Eastbourne; E. M. Jordon, Ryde; J. O. Gibson, Birmingham 5; G. G. S. Couldwell, Newcastle-on-Tyne; P. A. Lawson, Sutton Coldfield.

August "Engine Name Building" Contest.—1st Prize: D. M. Thomas, Birmingham 28; 2nd Prize: I. Balfour, Edinburgh 4; 3rd Prize: J. Poulter, Addlestone. Consolation Prizes: R. Stevenson, Maidstone; B. Carter, Shipley; B. D. Sullivan, Aylesbury; D. Edgley, Northampton; J. F. K. Hinde, Harrow-on-the-Hill.

September "Photographic" Contest.—1st Prizes, Section A: E. Davies, London S.E.9; Section B: B. R. L. Prior, Ash. 2nd Prizes, Section A: J. H. Taylor, Aberdeen; Section B: J. E. Downes, Whaley Bridge. Consolation Prizes: F. G. Reynolds, Sidcup; R. W. Staniforth, Ranby; N. B. Patton, Sandown, I.W.; M. F. Haigh, Repton.

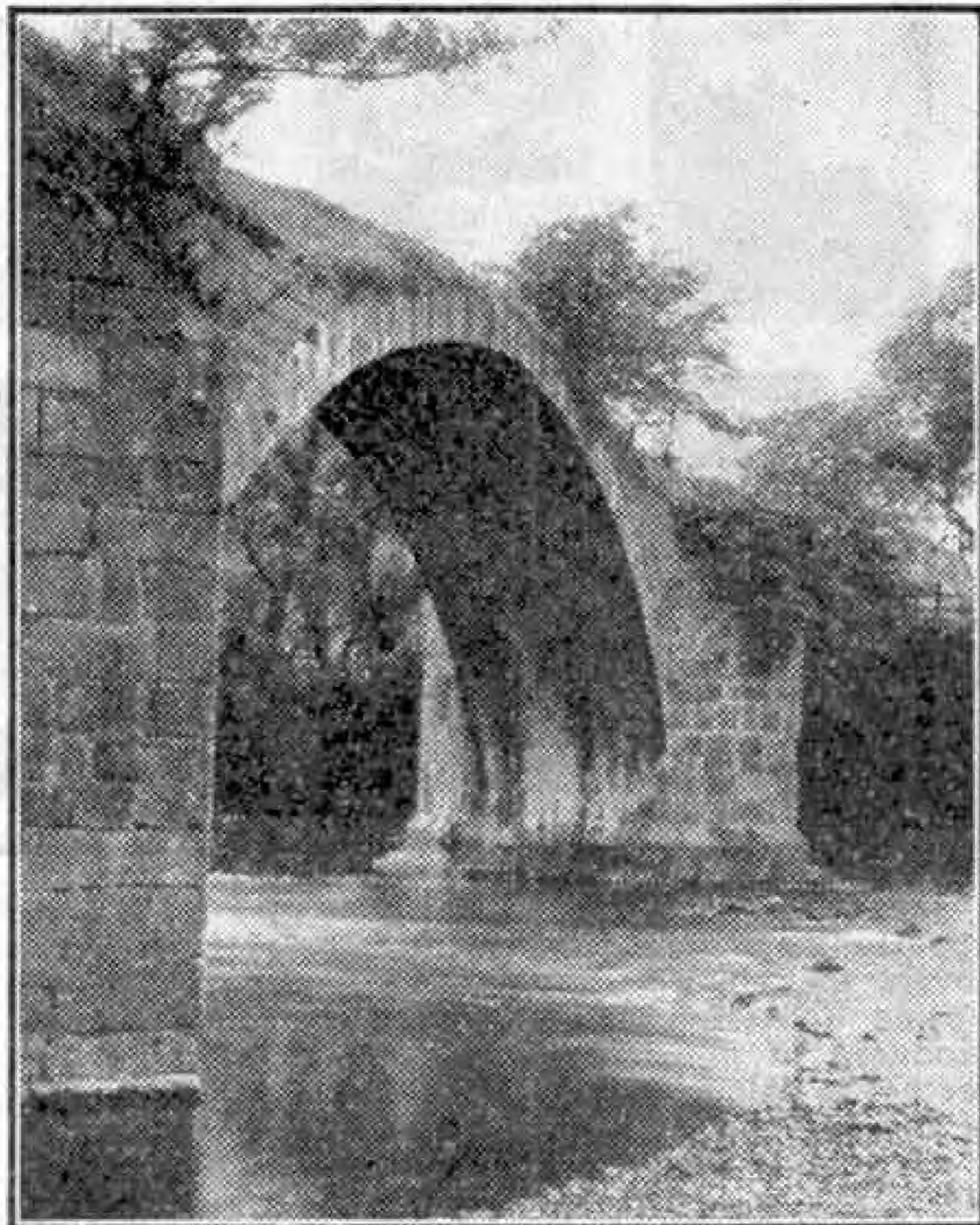
OVERSEAS SECTION

September "Shunting" Puzzle.—1st Prize: J. Old, Levin, N.Z.; 2nd Prize: K. W. Dey, Hamilton East;

3rd Prize: B. Ollett, Perth. Consolation Prizes: A. Rowe, Hawkes Bay; D. G. V. Malcolm, Port Elizabeth.

September "Code Word" Puzzle.—1st Prize: G. B. Murray, Auckland, S.W.2; 2nd Prize: J. Old, Levin, N.Z.; 3rd Prize: J. P. Smith, Cape Town. Consolation Prize: K. W. Dey, Hamilton East.

September "Photographic" Contest.—1st Prizes, Section A: Wing Lam Tsun, Transvaal; Section B: L. Smith, Cape Town. 2nd Prizes, Section A: F. Green, Durban; Section B: H. Jones, Melbourne. Consolation Prize: J. Henderson, Auckland.



The old pack horse bridge at Mitton over the Hodder, a tributary of the Ribble. An article on "The English Bridge" appears on page 2 of this issue. Photograph by Will F. Taylor.

October "Crossword" Contest.—1st Prize: H. F. Thornton, Port Elizabeth; 2nd Prize: P. A. Gibbs, Durban; 3rd Prize: D. G. V. Malcolm, Port Elizabeth. Consolation Prizes: B. Maisel, Johannesburg; B. Ollett, Perth.

October "Locomotive Names" Contest.—1st Prize: R. A. G. Ogden, Victoria, B.C.; 2nd Prize: H. I. Walker, Cape Town; 3rd Prize: J. Lake, Queensland. Consolation Prize: F. White, Transvaal.

November "Locomotive Figureword" Contest.—1st Prize: K. W. Dey, Hamilton East; 2nd Prize: M. R. McGregor, Christchurch; 3rd Prize: J. Hodgkiss, Cape Town. Consolation Prizes: A. Rouillard, Mauritius; F. Jowett, Toronto.

November "Meccano Parts" Contest.—1st Prize: E. W. Sykes, Cleveland; 2nd Prize: D. G. V. Malcolm, Port Elizabeth; 3rd Prize: O. Owens, Johannesburg. Consolation Prize: A. D. Ball, Claremont.

November "Photographic" Contest.—1st Prizes, Section A: D. G. Gray, Auckland; Section B: J. R. Clarke, Roseville. 2nd Prizes, Section A: J. Turner, Woodville; Section B: G. H. Jones, Claremont. Consolation Prize: B. Small, Natal.

December "Photographic" Contest.—1st Prizes, Section A: L. W. Humm, Geraldine; Section B: B. Wilson, Wellington. 2nd Prizes, Section A: G. J. Harrison, Transvaal; Section B: D. Dunkerley, Cape Town. Consolation Prize: J. L. Smith, Auckland.

Fireside Fun

"Why does lightning never strike twice in the same place?"

"Dunno, unless it's because the place where it hits once isn't there any more."

"What on earth is the use of putting train times in the timetable when the trains are never here up to time?"

"Well, Sir, we have to know how many minutes the trains are late, haven't we?"

"The people in the flat above made an awful row about two o'clock this morning."

"Woke you up, did they?"

"Well, not exactly. I had stayed up a bit to practise on my cornet."

"No thanks, I won't join your football club. I like clean sport."

"What on earth do you mean?"

"Oh, swimming."

"In Scotland we have nae mayors. We have provosts."

"Oh, and do they wear chains, like English mayors?"

"Nae, they juist gang about loose."

"Not much grass on the field, is there?"

"What about it? You came here to play football, not to graze, I suppose."

BRAIN TEASERS

A SHARP WORKER

I am a word of 10 letters. My 8, 9, 10 is single. My 7, 3, 4 is useful to keep things in. My 2, 3, 4, 5, is on bacon, and I am whirled round at high speed. What am I? B.I.N.

WHAT COMES NEXT?

If you were given the numbers 1, 2, 3, and asked to add the next number in the series, you would promptly say 4. Can you complete the following series in the same way by adding a fourth to the three terms given?

1; 4; 13; —: 2 Halfpennies; 5 Pence; 26 Threepenny Bits; —: Lieutenant A; Captain C; Major F; —: Rectangle; Hexagon; Octagon; —: Violet Day; Indigo Week; Blue Month; —:



"What is the meaning of this, Mary?"

"Well, Mum, I got him in to crack the nuts with his truncheon!"



"Is that yours, Smith?"

"Not at all, Sir. You saw it first."

HARD TO GET

In each of the three lines of jumbled letters given below there is the name of something that is familiar to all of us. Can you pick out these three names?

Z V M X N E P Q C R E S C A R T
N T O

F G I D V K I L P N T K S T Y R
T J O H A Y L E S

A G H S T O I R Y S N K Z B O Y
Z T K L R E A T R I O N T S

GOING, BUT STANDING STILL

Have you ever heard of a clock that keeps going and yet always shows exactly the same time. There isn't such a clock really, but it is possible to imagine conditions in which a clock, complete and accurate in every respect, will behave in this way. Can you say what these conditions are? If so send a postcard with your solution to "Brain Teasers, Meccano Magazine, Binns Road, Liverpool 13." A prize of 2/6 will be awarded for the best postcard received.

SOLUTIONS TO LAST MONTH'S PUZZLES

The solution to the trick crossword in the December "M.M." is given here, and speaks for itself.

Finding the two numbers in our second puzzle is really easy. All that you have to do is to subtract 25 from the number your friend tells you, and the two figures in the result are always those of

B	E	N	T
B	E	N	T
B	E	N	T
B	E	N	T

which he thought. In this case subtracting 25 from 62 gives 37, so that 3 and 7 are the numbers wanted.

In our third puzzle it is easy to see that Bill stayed on the first floor and Harry went to the fourth floor. As Dick went to the third floor, John must have stayed on the second floor. Turning now to the articles themselves, the Meccano Outfit must have been sold on the second floor, so that John bought it. Bill did not buy the stamp album, as he despised hobbies of all kinds, and nothing to wear was sold on the first floor, so he must have bought the book. Dick did not buy a tie, so he must have bought the stamp album and Harry therefore bought the tie. Books clearly were sold on the first floor, Meccano Outfits on the second, stamp albums on the third, and ties on the fourth.

THIS MONTH'S HOWLER

"An encyclopædia is a professor on a bicycle."

*"Mars
ARE MARVELLOUS"*



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*ZONED
TO THE SOUTH*

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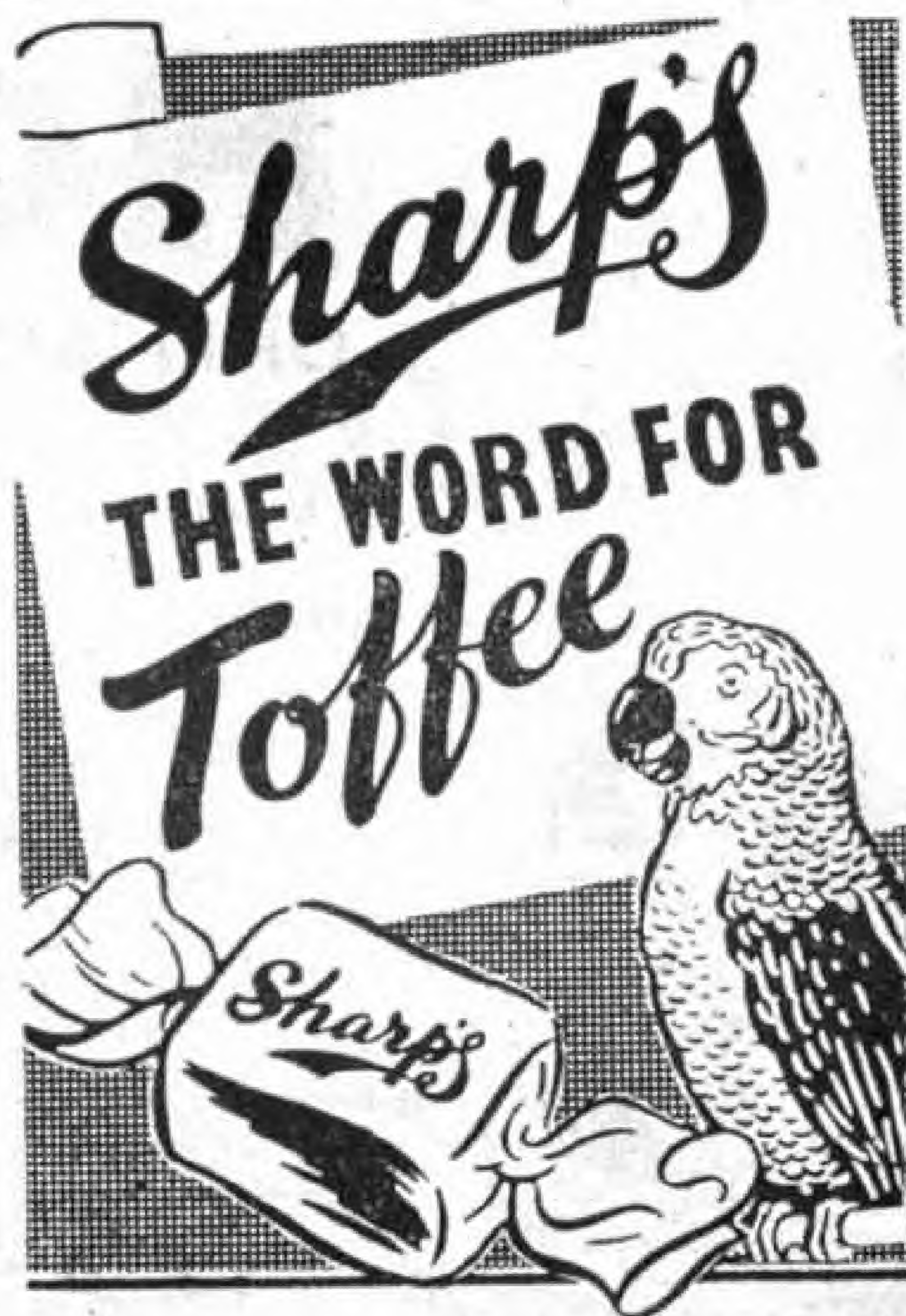
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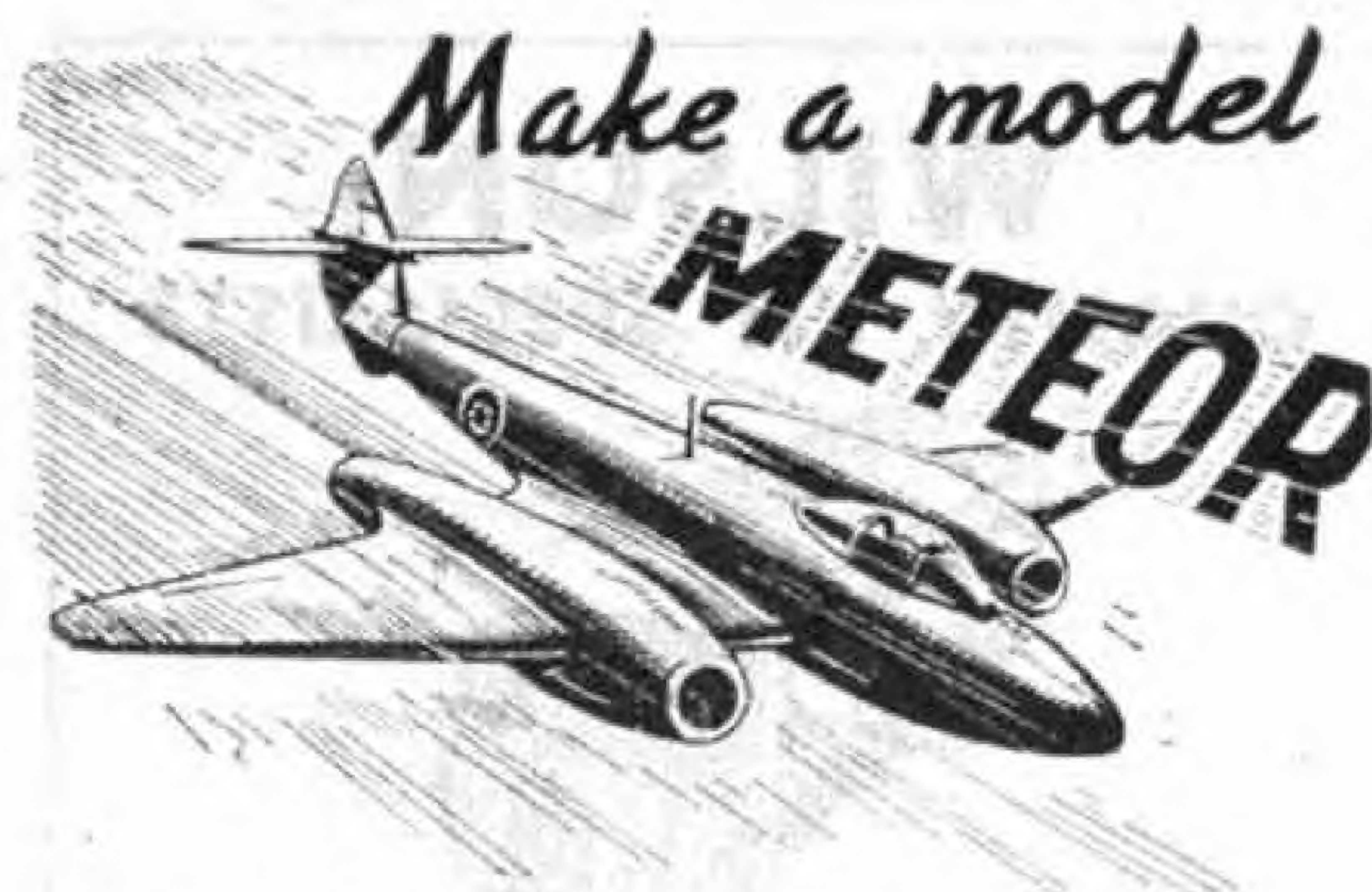
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Drawing Office Practice	(State which branch)
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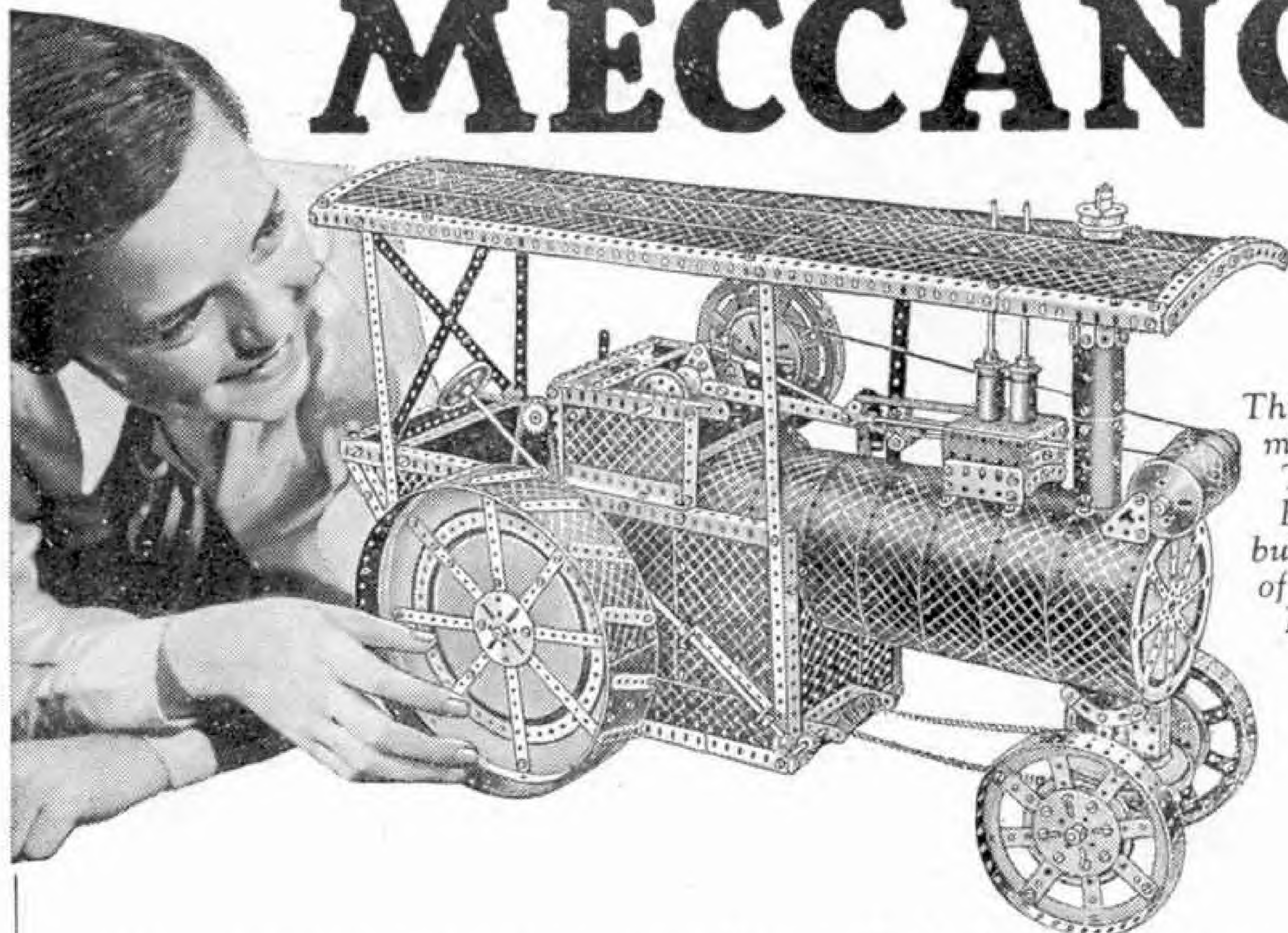
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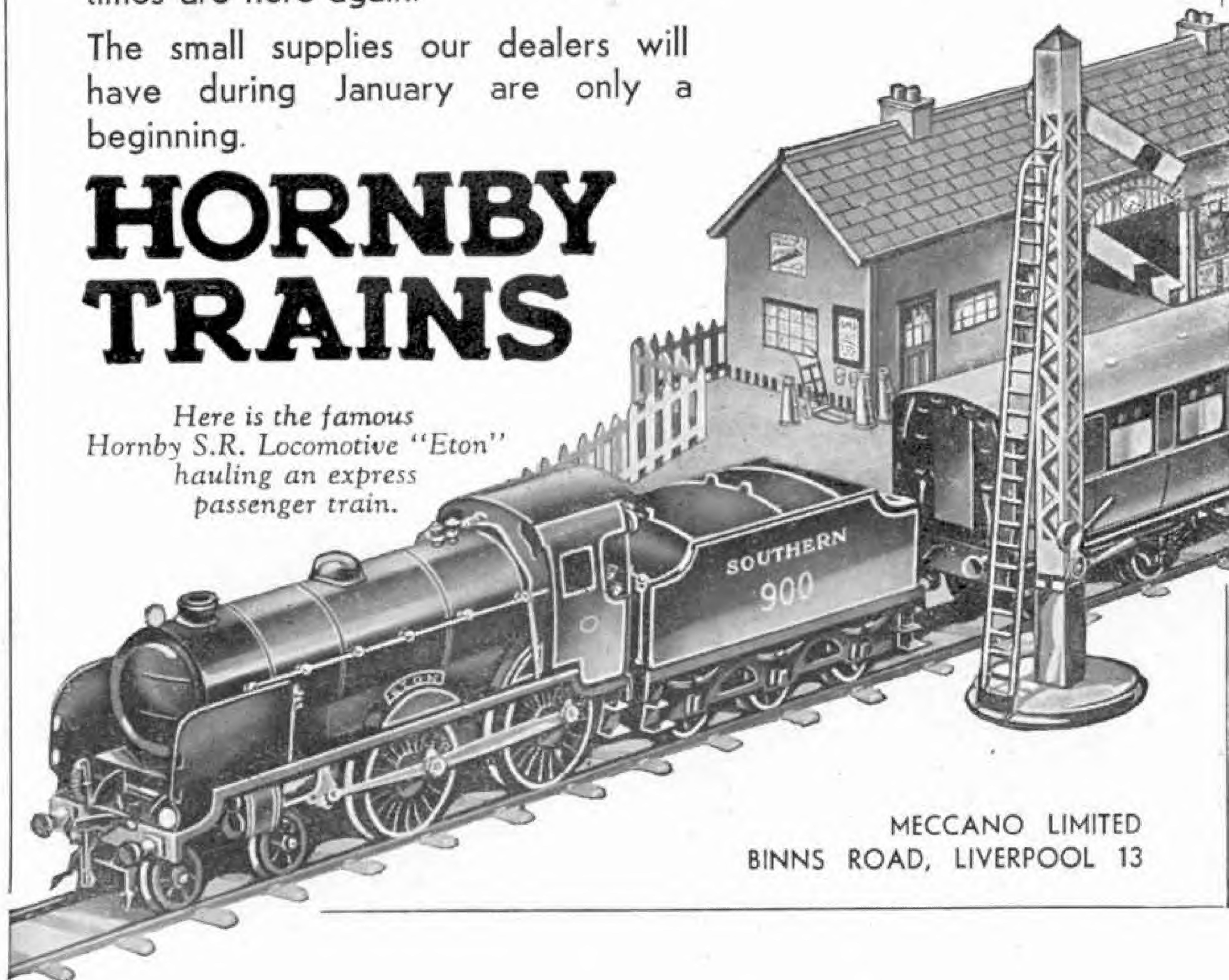
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